

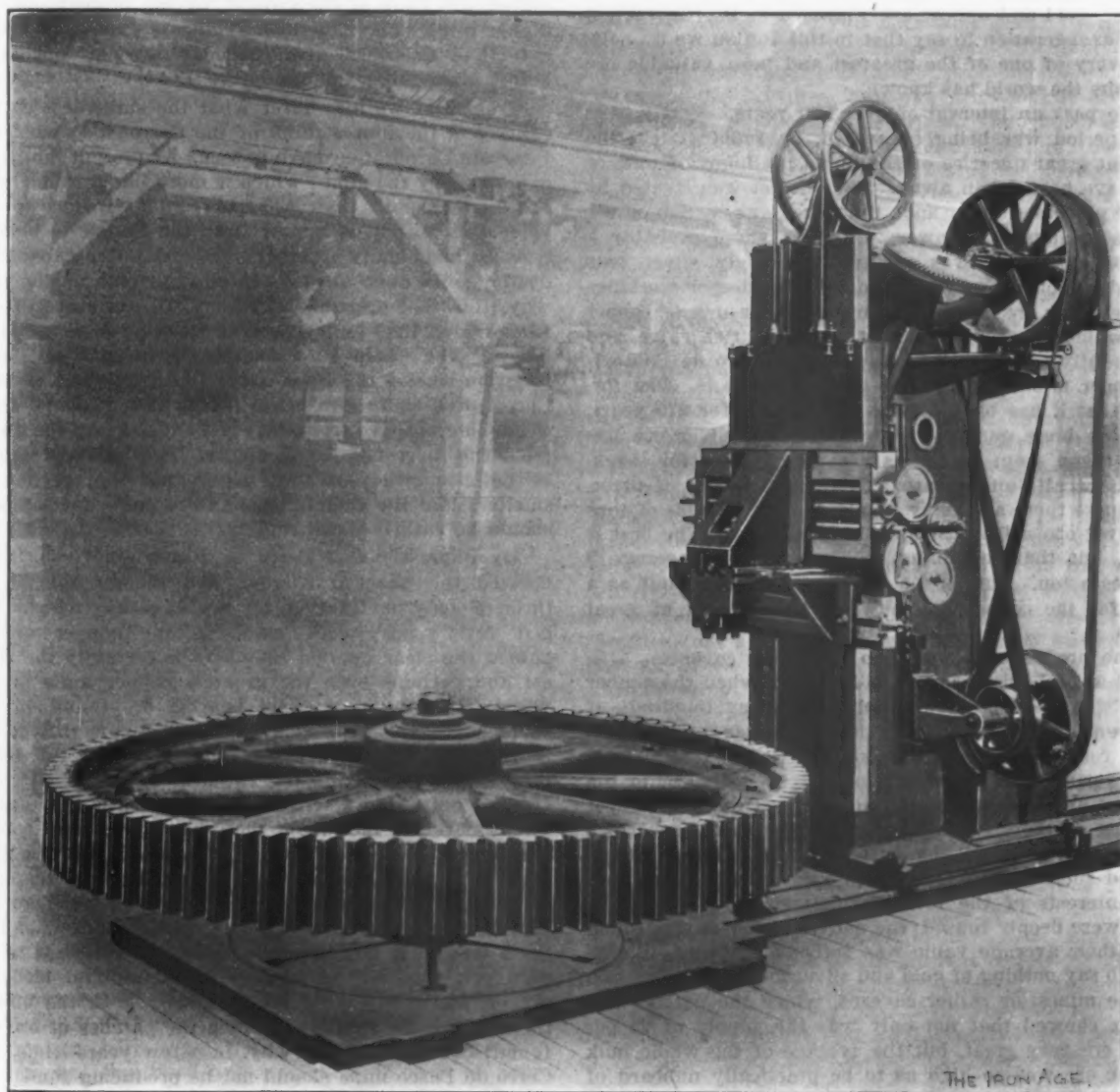
# THE IRON AGE

THURSDAY, DECEMBER 4, 1902.

## New Gear Planer at Works of R. D. Nuttall Company.

Owing to the very rapid growth of their business in the past few years the R. D. Nuttall Company of Pittsburgh, manufacturers of cut gears, have found it necessary to constantly add to their equipment and at the same time to provide themselves with tools for turning out very much larger work. Among recent tools placed

spaced around by the dividing mechanism and the teeth are shaped to templates by a tool carried in the vertical slotter. The slotter has a stroke of 5 feet and is driven by a spiral gear connected to a bevel gearing on the countershaft. The planer is driven by an independent 10 horse-power motor, incased in the machine column, while the cutting and forming head is operated by a spiral gear drive. The present capacity of the planer is spur gears 30 feet in diameter by 60 inches face, but



NEW GEAR PLANER AT WORKS OF R. D. NUTTALL COMPANY.

In their plant is a spur gear planer, designed for planing large spur gears by the use of a single cutting tool and templates. The engraving shows the heavy class of work handled by this machine, which embraces some new and interesting features in its construction. While the operation of the machine is similar to that employed in some of the beveled gear shapers, this is an original application of the principle to the formation of spur gears, inasmuch as the gears are placed on the machine in a horizontal position instead of perpendicular, as on other machines. When set in place the top of the dividing table is nearly flush with the shop floor and most of the indexing mechanism is below the floor line. The gear, lying flat upon the dividing table, is accurately

with slight alterations the machine can be arranged to cut gears 36 feet in diameter. It can also be arranged so that the diameter of the gears to be cut is limited only by the available floor space. The machine is also capable of planing teeth up to 10-inch pitch.

The Bruck Solidified Oil Company, 256 Dover street, Boston, Mass., have been organized to manufacture solidified oil for electric car motors, car journals, automobiles, wagon axles, engine bearings, &c. They state that their product is made of lubricating oil by a process which is entirely new. It is put up in 1 gross packages of 1 pound each and in packages of 10, 15, 25, 30 and 50 pounds; also in half barrels and barrels.

### A Great Copper District in Peru.

J. B. Haggin, one of the most famous mining capitalists in this country, who is, or was, the leading owner of the Ontario, Homestake and Anaconda mines, has in recent years taken up the development of the Cerro de Pasco mines of Peru. An interesting account of that enterprise is contained in a special report to the London *Economist* by the special mining commissioner of that journal, who has in recent years written an admirable series on all the noted mines of the world. We quote from it the following:

In the year 1630, an Indian, prospecting in the mountains at a height of 15,000 feet, discovered a new silver mine—the mine of Cerro de Pasco—which ever since then has been a great silver producer, and is still unexhausted. But not only was this a silver mine; underneath its deep layer of silver ore lay almost equally vast areas of copper ore, and quantities of lead, bismuth, manganese, gold and almost every known metal. In fact, it is no exaggeration to say that to this Indian we owe the discovery of one of the greatest and most valuable ore deposits the world has known.

We pass an interval of over 250 years. Slowly over that period was being excavated, by Indian labor, the present great quarries of the Cerro. Millions of tons of ore have been taken away. The poorest was treated by crude processes on the spot, the richer was carried on the backs of llamas to lower altitudes, where probably a higher extraction was secured. But only silver was mined. Then, a few years ago only, the deeper workings in the silver ore penetrated down into an area of copper ore, which was found to be of unusually rich value, and apparently of great size. And to-day Cerro de Pasco is a copper mine—perhaps the greatest there is. One forgets that it has been a great silver mine for 270 years, and the huge quarries from which the silver ore has been taken seem only a natural preparation for reaching the wealth underneath. This is not the day of silver. I suppose there are many hundreds of thousands of tons of silver ore still left in the Cerro quarries. The best is gone, but that remaining will, at a guess, average 9 ounces a ton. This is too poor to treat alone, but as a flux for the copper ore may yet be an asset of great value.

The ore deposits at Cerro de Pasco cover an area equal to probably 1 square mile. This, when the copper zone was discovered, was split up among hundreds of different owners, and the mining work was done on contract for these owners by Indians. Before long a hundred tortuous spiral stairways had been sunk into the copper, and the natives, having gouged out the richest patches of the ore, were carrying it on their backs to a hundred dumps on the surface. These dumps represented such a big underground area of copper ore that the interests of the few mining men who visited the field were deeply roused; the more so when it was found that their average value was fully 25 per cent. in copper, to say nothing of gold and silver as well. Inspection of the mines, or rather caverns, which the natives had made, showed that not only was the supply of 25 per cent. ore very great, but the average of the whole bulk of the ore was so high as to be practically unheard of hitherto in a big copper deposit.

A few years ago, after the great value of this copper mine had been demonstrated, and when the many small owners of the area were sending away their picked ore on the backs of thousands of llamas, there came a certain one to the authorities of the Peruvian Corporation—which is a London concern, bound up in the development and furtherance of Peru—and this is what he said: "Gentlemen, your company have not prospered of late. Your railways pay indifferently and your sugar estates not at all. Peru is falling into disrepute and your corporation along with it. But there has lately been brought to notice on the Andean Plateau the most wonderful mine in South America. Its area is split up among many small owners, but it is quite certain that the whole of it, or at least nine-tenths, can be bought for a mere fraction of its intrinsic value. Your railway to Oroya taps this country. By extending the railway 80 miles over the plateau you can reach the mine itself, tapping a flour-

ishing agricultural and mining district; and this great property and its traffic will become yours for a mere song. I beg of you to have this scheme examined, for assuredly it will make your fortune." But to him answered the mouthpiece of the Peruvian Corporation: "Young man, do not raise your voice within these portals. Our directors are at present enjoying their afternoon sleep. They are not so young as they were; nor so eager to go into new ventures. Where could we raise so much money to build a new railway? Moreover, we do not share your belief in the value of Cerro de Pasco. Good afternoon." And so, once more, the lethargic, self-satisfied Englishmen threw away a great opportunity, and in due course a syndicate of Americans, having at its head the greatest metal mining capitalist in the United States, appeared on the scene and promptly bought the whole thing up. Its first purchase consisted of about 35 per cent. of the Cerro area, for which it paid, I am informed, about £600,000. Since then it has acquired still more of the ground, paying proportionally a higher price. The American syndicate expects to spend a total of £1,500,000 over the next three or four years before producing a ton of copper.

From that we may infer what the shrewdest copper experts in the States think of the Cerro—also what the Peruvian Corporation have missed. At present the syndicate has only the mine—which is more like a rabbit warren underground than a copper mine; it has to develop this, to import a staff from the States, to build a railway and finally to erect a huge smelter capable of dealing with such a vast deposit. As regards the railway, this will probably run from the terminus of the Lima-Oroya line, and will have to be over 80 miles in length. The Cerro de Pasco Syndicate will no doubt insist on leasing the Lima-Oroya line from the Peruvian Corporation at its own price; failing this, it would build a new line to Cerro from the coast and take all the traffic from the inert London company. This railway should be built in two years, and after that the erection of smelters and the completion of the mine's development should be rushed ahead rapidly.

My impressions of Cerro de Pasco are fresh. I inspected the mine in August, and though able to go through only a fraction of the caverns which the last few years' work made in the copper ore, I gained the clear opinion that here is certainly the richest and perhaps even the greatest copper mine in the world. The depth of silver bearing ore found on the surface probably averages 200 feet. Below this comes the copper zone; its depth is, I believe, not yet determined, but it is probably almost as much as this. Heaven only knows what may lie beneath that again! The remarkable fact about these huge patches of copper ore is their richness. The Indians mined only the best ore. What they have sent away hitherto has averaged 25 per cent. Most of what they reject as too poor appeared to me to average 12 to 15 per cent., and of this there seemed to be millions of tons. Of course it is too soon yet, pending extensive development and blocking out of ore, to say what there actually is in the mine—the square mile or so over which the patches of ore are found; but I do not see why, in a few years' time, the Cerro de Pasco mine should not be producing something like 4000 tons of copper a month. Compared to Cerro, the best mines at Butte are poverty stricken, and in five years or so, when such great present producers as Anaconda are nearing their end, this big yield from Peru will more than make good any deficiency that may happen to the States' output. Geologically, much will be written in the future about Cerro. Here and there in the copper zone are patches carrying, instead of or in addition to copper, manganese, bismuth of high grade, lead and other unusual compounds. In all the ore there is an appreciable quantity of silver, and in certain areas gold values are found running to several ounces to the ton. Altogether, from a mining point of view, it is simply a marvelous spot. The town of Cerro de Pasco is the highest in the world. The altitude is very severe on a white man, and in going through the mine I had to rest every few steps to recover breath. This matter of altitude is, of course, a severe drawback to the place. It would ruin a smaller mine altogether. Out of every 100

picked men sent to Cerro one-third will not be able to stand the climate, and most of the rest will never be at their best, mentally or physically. For this reason working costs will be high. Mining will be dear, because of the expense of taking out big flat bodies lying under the friable zone of silver ore. But then, again, what does that matter?—the ore will average 12 per cent. copper, and can be treated on a vast scale. The mere brute force of value is enough to override far worse difficulties than this.

### Decadent Industrial Works.

BY A. H. H.

At a time like the present, when American manufacturers are at a point of prosperity beyond all previous records, when every energy is being put forth to keep pace with the demands upon mills and factories, the thought of decadence may seem inappropriate for serious consideration. Viewed as a general and national condition, there is little cause for alarm. This country has set a standard of quality, cost and time of production entirely its own. Its supreme rank among manufacturing nations, taking as a basis even the most palmy days, is well assured. A period of industrial activity in length equal to others in history may therefore at least be expected, and too short a time has now elapsed for the end to be in sight.

There is, however, a viewpoint of decadence not applicable to the country at large, but to individual concerns. It is not necessary to single them out. There are notable instances in every industrial center, whether it be the large city or the purely manufacturing small town. The beginning of decadence and the form it first takes may be hard to fix, for it is not of like nature in each case. A careful analysis of several industries suffering from decline, by one in close touch with their past, will at times reveal traces which date back to the most active period in the history of the firms. Considering all that daily comes up demanding immediate and continuous attention in the busiest period of a concern's existence, it is no marvel that degeneration should then have a beginning in some portion of the establishment. No organization has yet been so wholly perfect as to entirely eliminate leaks, unnecessary expenses and wastes of all nature. The lowest percentage of such items mark the closest attainment to this end. The overflowing order book, at prices which have not been trimmed, is ever a pleasant and comforting contemplation. There are, however, other books which contain the orders for the materials used to execute this business, and a less comforting feeling possibly may here exist. Prevalent conditions therefore demand more than a superficial review.

It has been said, and perhaps very correctly, that decadence in any industrial works begins just the moment that concern ceases to progress, whether in dull or active times. Progress in more ways than one may be made when there is not a steady inpour of orders at a large profit. Improved products, reduced costs of manufacture and increased outputs are the earmarks of any concern that avoids decadence. When the reins upon these three factors are loose just so soon it may be expected that features of decline will begin to show themselves. Occasional new inventions and processes revolutionize previous practice; among industries at once affected thereby decadence may be expected. These conditions may not always be forestalled, although it is sometimes possible.

It is not iron manufacturing concerns alone that suffer from decline. Silk and textile mills, publishing houses and others are at times all subject to this disorder. In reviewing the foremost monthly magazines, for example, it is easy to enumerate those which occupy entirely different positions in point of influence among the public at large and evidently enjoy greater prosperity to-day than they did five or ten years ago.

Among the manufacturing concerns we see here and there those whose progress has been continuous, irre-

spective of removal by death or retirement of the men who, it would seem, during their most active period, have been the very life of the business. There has been no decadence. The casual observer is wont to ascribe this steady development to the manufacture of an article for which there is heavy demand with limited competition and which is sold at a large margin of profit. Often the actual conditions are the reverse, and yet the institution goes on and on increasing its dividends.

Again, other very similar institutions have fallen behind in prestige and are still on the downward trend, when at one time they were everywhere acknowledged to be the leaders in their lines. A study of the respective causes of such results in both cases recited above is keenly interesting, although when summed up there are, of course, but two net results—wise management and unwise management.

The untiring energy of a man well known to the writer built up a large industrial works to a high standard. The machines in efficiency and design were unquestionably the best in the market. This individual had closely associated with him in prominent office relation a number of men, any one of whom it seemed should have been able to carry on that business, to further develop and extend the usefulness of the concern. At a period when the profits of the yearly business were large, and at an age when the time came for permanent relaxation, the reins were turned into the hands of these associates. Though but a few years ago, the house is to-day on the list of those coming under the head of this article. The excellence of output had fixed a high standard for all the competing concerns in the same line of business, but others have reached and surpassed the high mark. The men now in charge seem content if they maintain the average under the previous management. There is little apparent effort to forge ahead, to seek a still higher basis. Self satisfaction is so evident that it is voiced from the boy who ushers you in to the man who signs the checks. Yes, the very atmosphere of the office reeks with it. The situation would be different were the consensus of opinion of users in general and the actual quality of the work turned out by competing concerns weighed upon a well balanced scale of thought and accordingly acted upon. The idea that a permanent prestige can be maintained only by unceasing development and improvement appears never to be considered.

Unwise contracts invariably work sad havoc with a firm's capital and reputation. Instances in every line may be pointed out where too much zeal in securing orders in large numbers, without proper regard to the conditions imposed, has resulted adversely. The more numerous these instances the greater the ravage on the resources of the concern. The loss on one such contract may easily eat up the margin on half a dozen profitable ones.

Our English cousins appear to have been somewhat slow in endeavoring to locate the real causes for alarm concerning the British industrial position. As one reviews the opinions which find their way into the English press, it is found that all the evil is not ascribed to the American labor saving machinery. There are workshop conditions, prevalent to a greater extent in Great Britain than here, which can but work ultimate destruction to any institution. They are more sporadic in America, but the inevitable result anywhere is the decadence of such works and the degradation of the employees.

The one feature referred to by the foregoing is absence of a method by which the services of workmen shall be paid for and recognized according to individual ability. In other words, the lack of a system which cultivates free development of personal ability and energy and brings such to the notice of employers.

The American Chamber of Commerce of Paris, with headquarters at 3 Rue Scribe, has issued a statistical report on coal, coke, pig iron and steel in France by districts. It covers the year 1899 and gives the names of the steel works in each district, with the output of many of them.

## The Operation of the Federal Bankruptcy Law.

### The Report of E. C. Brandenburg.

WASHINGTON, D. C., November 25, 1902.—From the fourth annual report upon the operation of the Federal Bankruptcy law, which has just been transmitted to the Attorney-General by E. C. Brandenburg, in charge of bankruptcy matters in the Department of Justice, it appears that there has been an important decrease in the number of voluntary petitions filed during the past year as compared with any previous year since the law was enacted. This showing will be most encouraging to the friends of the law and will materially strengthen the movement in Congress looking to prompt action upon the pending Ray bill, designed to remedy the defects which the practical operation of the statute has developed.

#### Voluntary Cases.

The grand total of voluntary petitions filed throughout the United States for the year ending September 30, 1902, was 16,374, as compared with 17,015 in 1901; 20,128 in 1900 and 19,176 in 1899. The aggregate for 1902 was made up of 9052 cases filed during the six months ending March 31, 1902, and 7322 filed during the six months ending September 30, showing a material decrease not only for the year but for the last six months.

The States showing the largest number of cases filed during the year are as follows: New York, northern district, 432 petitions; southern district, 811 petitions; eastern district 247 petitions; western district, 416 petitions; total, 1906 petitions. Illinois, northern district, 1650 petitions; southern district, 164 petitions; total, 1814 petitions. Alabama, 1436 petitions; Massachusetts, 1408 petitions; Maine, 860 petitions; Ohio, 770 petitions. In this connection it is interesting to note that in the last report Illinois leads the list of States with 2266 petitions, while New York followed with 2187 petitions. Massachusetts was third and Alabama fourth.

The total net assets realized in the voluntary cases closed during the year were \$7,447,803; while the liabilities involved therein were \$183,060,341. The summary also discloses the fact that of the cases closed there were 7010, with assets of various amounts, in 4383 of which they were less than \$500, while in 6278 proceedings there were no assets. This demonstrates the fact that advantage of the law, as a rule, is only taken in cases where the debtor has become hopelessly insolvent.

The reports show that of those who went into voluntary bankruptcy 1320 were farmers, 6859 wage earners, 2585 merchants, 235 manufacturers, 531 professional men and 1758 contractors, hotel and saloon keepers, real estate operators, &c.

#### Involuntary Petitions.

During the year 2108 petitions in behalf of creditors to have debtors adjudged bankrupt for committing various acts of bankruptcy were filed throughout the United States, of which 302 proceedings were dismissed, either because the court was without jurisdiction or because no act of bankruptcy had been committed. Of the involuntary proceedings compositions were entered into and confirmed in 125 cases.

Of the parties against whom involuntary petitions were filed the reports, which are incomplete on this point, show that 542 were engaged in mercantile pursuits, 87 were manufacturers, 8 were professional men and 164 were of a miscellaneous character. The report also shows that in eight cases the occupations were alleged to have been those of farmers and in 65 wage earners, but as under the law neither a farmer nor a wage earner can be adjudged an involuntary bankrupt, it is presumed that these parties were engaged in such occupations at the time the petitions were filed, but that such was not their previous occupation.

In 874 involuntary proceedings which were closed during the year the assets realized amounted to \$3,436,662, while the liabilities were \$15,086,206. In other words, the assets were about 23 per cent. of the liabilities. In 105 cases there were no assets, and in 153 cases they were less than \$500.

#### Practical Operation of the Law.

In reviewing the developments under the Federal statute Mr. Brandenburg says that the law having been in force a little more than four years we are now in a position where something definite can be stated as to its practical operation. As was anticipated when the law was enacted, the abnormally large number of petitions filed for the first few years of its operation were in behalf of persons who were hopelessly insolvent and who took the opportunity afforded of throwing off their financial burdens. Thus there were filed in round numbers something over 19,000 voluntary petitions during the year ending September 30, 1899; 20,000 in 1900, 17,000 in 1901 and during the past year but 16,374. The material decrease noted may be attributed to two causes: First, to the era of business prosperity now prevailing, and, second, because the large number of those oppressed by misfortunes that overtook them during the financial disturbances of 1892 and 1893, and since the repeal of the prior law in 1878, promptly sought relief under the new law, and their petitions have been largely disposed of. The number now filing petitions is presumably about the normal of those who would in the absence of a Federal law on the subject seek relief under the State Insolvency laws.

While the idea of a bankruptcy law is based upon principles of humanity, and it was doubtless this which largely actuated the framers of the Constitution in expressly authorizing Congress to enact a uniform law on the subject of bankruptcy throughout the United States, nevertheless, it is stated that instances do occur where unworthy individuals escape detection and reap its advantages. While this is true, the absence of a bankruptcy law would be no guarantee that fraud would not be perpetrated under the State Insolvency laws, since under the liberal provisions of many of the latter laws the opportunity for fraud and the difficulty of detection would be greater than under the Federal statute. While the earlier insolvency laws went upon the hypothesis that the bankrupt was a criminal, this is no longer true. It is presumed, therefore, that among this large number of insolvents who have been relieved of past obligations there are many worthy and useful citizens restored to business activity, who have heretofore been deprived of the opportunity of engaging in mercantile pursuits in their own behalf.

While there are cases where parties have unworthily received the benefits of the law, it is not possible to frame any law that will entirely prevent fraud, though it may be safely said that the opportunities in this respect, under the present law, are reduced to a minimum. Under the existing statute provision is made by which the bankrupt, his relatives and others who are in any wise connected with bankrupt's business may be subjected to examination, with the result that many persons are deterred from making fraudulent conveyances or preferences or concealment of their assets. In many cases the examination provided by law has resulted in the disclosure of interests and assets of the bankrupt which ultimately resulted to the benefit of the creditors of the estate. Under many of the State laws these features are wanting. Notwithstanding criticisms of minor provisions of the present law, as a whole it is greatly preferred by the commercial interests of the country to the diverse State statutes on the question of insolvency, which vary with the number of States.

During the past year, Mr. Brandenburg says, there was introduced into the House by Hon. George W. Ray, chairman of the Judiciary Committee, Bill No. 13,679, embodying various amendments to the law, to meet criticisms of such provisions as the practical operation has demonstrated to be faulty. This bill was prepared after an extensive canvass of business interests throughout the United States, as well as of the numerous referees in bankruptcy who are actively engaged in the administration of the law, with the result that the Ray bill was a substantial crystallization of the views and opinions of those who are most vitally concerned. This bill, after careful consideration by the House, was on June 17, 1902, passed by a vote of 137 to 66, and is now pending before the Senate.

It is perhaps unnecessary to refer in detail to the pro-

visions of this bill, but Mr. Brandenburg thinks it may be safely said that it meets with general approval and removes several features which are objectionable as the law now stands, notably that which requires a creditor to surrender payments received on account prior to permitting him to prove his claim for the balance, as the Supreme Court of the United States, in *Carson, Pirie, Scott & Co.*, said should be done under section 57g of the law; it also authorizes suit by trustees and others in bankruptcy matters in the Federal courts, and thus furnishes the expedition in the settlement of insolvents' estates which is vitally essential in proper administration, as pointed out by the Supreme Court in the case of *Bardes vs. Bank*; and it prevents a person who has been once adjudged a bankrupt from again filing his petition for a period of seven years. There are numerous other minor provisions which have been perfected in order to protect the interests of the commercial world, and as a result it may be said that with its enactment the United States will have a law with reference to the settlement of estates of insolvents that will be the equal of that upon the statute books of any nation.

W. L. C.

### The New Butler Drill Chuck.

We here illustrate a new drill chuck which has recently been brought out by the Butler Chuck Company of Greenfield, Mass.

This chuck is built on new lines, and the results obtained from its use are highly satisfactory. Fig. 1 shows the chuck in two sections, with the working parts ex-

posing the body of the chuck to the right it travels up the arbor at the same time the plug travels down into the cap, forcing the jaws out with just half the revolutions usually required, also confining the travel of the body to a very short distance.

The distinctive feature of this chuck is its enormous grip upon the tool it is holding. The friction rests on the plug, and the grip of the hand becomes greatly multiplied through the differential screw. By the aid of this same feature the resistance of the work continually tends to tighten the grip. The chuck is made of steel throughout, with such parts hardened as are subject to wear.

The Secretary of the Interior in his annual report states that for the first time in the history of the Patent Office the total number of applications in all branches exceeded 50,000 this year. The report of the Com-

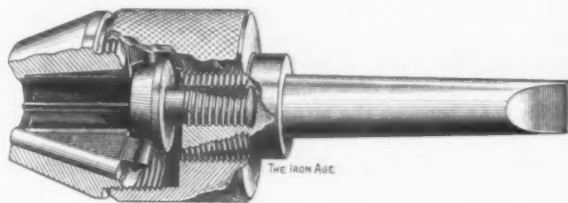


Fig. 2.—Broken View of Chuck.



View Showing Parts of Chuck Separated.

### THE NEW BUTLER DRILL CHUCK.

posed. It consists of an arbor, sleeve, cap, plug and jaws, as shown in the broken view, Fig. 2. The arbor and sleeve appear at the left, the cap, plug and jaws at the right in Fig. 1. The arbor, or shank, can be turned to any taper desired. The end of the arbor, or that portion which enters the sleeve, has on its surface a right hand thread. The center of the arbor is bored and tapped to receive the left hand threaded plug corresponding to the thread on the surface. Around this arbor revolves the knurled sleeve, to which is rigidly attached the conical cap. The sleeve and cap work together except when assembling or dismantling the chuck. Within the conical cap are three oblique, converging channels which guide and support the jaws. Above the cap in Fig. 1 is shown the left hand threaded plug, on the lower face of which are three horizontal converging channels in exact relation to those in the cap and into which are inserted the upper flanges of the jaws.

The jaws are wedge shape forgings, on the back and top of which are circular flanges to correspond with the channels in the cap and plug. When the chuck is assembled the plug is screwed into the arbor and the knurled sleeve screwed firmly to the cap. Thus by re-

missioner of Patents shows that there were received 45,562 applications for mechanical patents, 1807 applications for designs, 139 applications for reissues, 1849 caveats, 2460 applications for trade-marks, 1020 applications for labels and 270 applications for prints. There were 27,387 patents granted, including reissues and designs, and 1864 trade-marks, 750 labels and 163 prints were registered. The number of patents that expired was 20,335. The number of allowed applications which were, by operation of law, forfeited for non-payment of the final fees was 4123. The total receipts of the office were \$1,491,538.85, the total expenditures were \$1,329,924.63.

Berlin dispatches state that three companies manufacturing machinery for the making of briquettes out of coal waste have been combined into a syndicate for the purpose of exporting this machinery on a large scale to America. The factories interested in the syndicate are located at Ernfeld, near Cologne; at Buckau, near Magdeburg, and at Zeitz, in Saxony. The title of the company will be the Export Briquette Machinery Syndicate. They have already received large orders for machinery from mine owners in the United States.

## Canadian Notes.

### Importing Steel Rails.

TORONTO, November 22, 1902.—Mackenzie, Mann & Co. recently closed a contract for about 40,000 tons of German steel rails and fastenings, to be used on their Canadian Northern Railway system, and for their lines in Nova Scotia. A large shipment of steel rails is on the way from Belgium to Vancouver, B. C., via Cape Horn. To the purchases for Mackenzie & Mann for their Canadian Northern road the attention of F. H. Clergue was drawn when he was in Ottawa on Thursday, and he was asked whether the rails could not be made in Canada. In reply he said that the German ironmasters kept up the price in the home market, but sold at a much lower figure in the foreign market in order to get the trade. "Mackenzie & Mann are reported to have purchased their rails for \$27 a ton, delivered at Port Arthur. We cannot afford to produce rails at that figure. We have spent \$15,000,000 in iron mines, and in the construction of rolling mills and railways to connect with them, and if other railway companies are going to follow the example of Mackenzie & Mann we simply cannot produce steel rails, that is all. The question is one for the people of Canada to decide." Mr. Clergue added: "At present the situation is this, that while the Government gives a bonus to encourage the production of steel rails, the absence of duties allows the market to be exploited by foreigners."

One of the acts passed by the Ontario Legislature in the session of 1901 establishes a new condition for the earning of subsidies rated by the Provincial Legislature. It provides that no cash or land bonus granted to any railway company in that session, or in any previous or subsequent session, shall be deemed to be earned unless the rails used by the company be manufactured in Ontario, or in some other part of Canada, if they are not procurable in Ontario. But the subsidized railway companies are not bound to buy here if the price is higher than that of similar rails offered at the same time in the open market of the United Kingdom or the United States. To this provision of the law Mackenzie & Mann would have to conform in so far as the laying of Ontario lines in their Canadian Northern system is concerned. But Canadian rails cannot be got at prices as low as those quoted by German manufacturers.

### Iron and Steel Bounties.

In reply to a question asked in the British House of Commons, Gerald Balfour said that he knew of no bounties on the export of Canadian iron and steel, but that there were bounties for the manufacture of these products, and he stated what these are. He added that the quantity of Canadian pig iron exported to the United Kingdom in 1900-01 was 1603 tons, and that the corresponding total for 1901-02 is provisionally stated to be 100,519 tons. This is the quantity given in the Trade and Navigation Returns, recently issued, for 1901-02. The total quantity of exports of pig iron in that year is 113,388 tons, of which 12,414 tons went to the United States. A very much larger proportion of the current fiscal year's output of pig iron, as of steel billets, is going to the United States and a smaller one to the United Kingdom.

On all these exports the bounty is paid, the same as on iron and steel which is consumed at home. In the first six months of the current fiscal year \$800,000 was paid out in bounties, but that sum by no means covered all the output on which claims were made, some of which claims are now the subject of litigation. The bounties earned on the pig iron exported last fiscal year would amount to at least \$225,000.

When the bounty act was introduced in 1896 Mr. Fielding, the Minister of Finance, stated that it was meant to apply only to such domestic iron and steel as should be consumed at home. To this Mr. Foster, who had been Finance Minister of the previous Government, objected. Mr. Fielding agreed to let the matter stand until he had time for further deliberation. Finally the act was passed without any exceptions.

### Iron and Steel Duties.

A meeting of the Ontario and Quebec iron and steel producers belonging to the Canadian Manufacturers'

Association was held in Toronto on the 18th inst. Frederic Nicholls was in the chair. About 30 other members were present. The object of the meeting, of which no report was given out, was to discuss tariff changes that have been proposed by various individual manufacturers of iron and steel. A large number of very diverse suggestions have been received in reply to the association's circular questions, and the meeting was for the purpose of reconciling these and agreeing if possible on a schedule.

### Trade with the United States.

According to the Trade and Navigation Returns, which have just been issued for the fiscal year 1901-02, Canada imported from the United States iron and steel merchandise as follows in that period:

I.—Dutiable Goods.	
Parts of railway cars.....	\$311,084
Bicycles .....	81,246
Parts of bicycles.....	119,980
Bituminous coal .....	5,924,670
Coal dust.....	234,550
Copper wire .....	89,836
Other manufactures of copper.....	42,182
Electric insulators.....	918,637
Electric motors, generators, &c.....	380,492
Agricultural implements.....	2,586,508
Springs, axles, &c.....	76,802
Bar iron.....	705,721
Bolts and hinges.....	28,928
Castings in the rough.....	196,074
Canada plates, &c.....	188,975
Cast iron pipe.....	35,167
Cast scrap iron.....	25,158
Chains .....	157,367
Tacks .....	18,836
Railway engines.....	748,129
Fire extinguishing machines.....	19,327
Steam engines and boilers.....	348,863
Fittings for iron and steel pipe.....	232,088
Ferrosilicon, &c.....	18,488
Iron and steel forgings.....	90,186
Hardware .....	593,443
Iron and steel ingots, &c.....	29,084
Iron and steel bridges, structural work, &c.....	151,561
Pig iron .....	597,420
Locks .....	137,007
Mining Machinery.....	48,500
Portable machines.....	587,649
Sewing machines.....	242,693
Slot machines.....	8,030
Typewriting machines.....	130,196
All other machinery made of iron or steel.....	3,155,940
Malleable castings.....	5,511
Nails .....	53,761
Plow irons.....	178,640
Pumps .....	186,424
Railway bars.....	67,520
Railway fish plates.....	75,069
Angles, beams, &c.....	641,591
Iron and steel hoop, &c.....	587,649
Iron and steel plates.....	692,425
Chilled iron and steel.....	7,591
Safes .....	20,895
Scales .....	100,775
Corrugated sheets.....	18,800
Skates .....	3,332
Skelp .....	233,860
Stoves .....	169,841
Stove plates, &c.....	10,073
Swedish rolled iron.....	2,166
Switches, frogs, &c.....	20,221
Tubing .....	535,141
Ware, galvanized, &c.....	181,392
Wire .....	522,163
Nuts, washers, bolts, &c.....	90,962
Wrought scrap.....	164,029
Pocket knives.....	3,298
Table cutlery.....	25,379
Other cutlery.....	59,910
Guns, revolvers, &c.....	158,384
Needles .....	27,376
Chrome steel.....	35,218
Steel bridge plate.....	44,357
Steel plates, worth more than 2½ cents per pound...	395,253
Tools .....	811,394
Other manufactures of iron and steel.....	1,326,987
II.—Free Goods.	
Anthracite coal.....	\$7,021,939
Ores .....	208,524
Church bells.....	24,436
Binder twine.....	1,507,344
Articles for making twine.....	176,428
Coke .....	775,774
Diamond drills.....	15,130
Ingot molds.....	18,911
Aluminum .....	27,070
Anchors .....	8,636

Brass .....	85,418
Brass bolts, &c.....	304,888
Britannia metal.....	9,879
Copper .....	193,660
Copper bolts, &c.....	1,061,634
Wire rods for making wire.....	1,212,205
Iron tubes for bedsteads.....	69,438
Steel bowls for cream separators.....	356,010
Ship beams, &c.....	56,156
Car and locomotive wheels in rough.....	30,760
Ship material.....	139,745
Tea lead.....	59,947
Beet sugar machinery.....	655,559
Mining machinery.....	791,733
German and nickel silver.....	13,914
Steel rails.....	1,377,237
Steel for various manufactures.....	400,336
Spelter .....	29,111
Tin .....	326,559
Tin plates.....	127,872
Tin foil.....	38,174
Barb wire.....	751,537
Galvanized wire.....	474,725
Zinc .....	22,249

#### An English Steel Man in Canada.

George G. Blackwell, head of the Liverpool firm, George G. Blackwell & Sons, which he founded 45 years ago, was recently in Toronto. In an interview he expressed the opinion that the Canadian iron and steel industry has a splendid future before it. Of the great plant at Sydney, Cape Breton, he spoke with admiration. As he makes a specialty of alloys he expresses a keen interest in the discovery of considerable bodies of the rarer elements used in some of these combinations, notably in a deposit of molybdenite, lately discovered in Haliburton district, Ontario. Some years ago, it appears, his firm made extensive tests of molybdenum steel and molybdenum nickel steel, which led to important conclusions. He says there is a market for every pound of molybdenum that is produced, and that it is well worth \$400 per ton. The ore, which usually runs from 50 to 65 per cent., is therefore worth \$200 a ton and upward.

#### Minor Notes.

During the fiscal year ending June 30 last the amount claimed from the Canadian Government in the form of bounty for the production of pig iron, puddled bars and steel ingots was \$947,361, of which \$791,089 was paid. The total production of iron and steel on which bounty was claimed was 413,039 tons, made up as follows: Pig iron, 341,654 tons, value, \$741,009. Iron bars, 6984 tons, value, \$20,549. Steel ingots, 64,401 tons, value, \$185,802.

Letters patent have been issued at Ottawa incorporating G. E. Drummond, F. C. Henshaw, T. J. Drummond, J. T. McCall and E. McDougall of Montreal and C. W. Guga of Chicago for the purpose of acquiring the property of the Londonderry Iron Company and exploiting and developing the same. Capital, \$1,000,000.

For the output of the month of September the Dominion Iron & Steel Company claim \$70,000 in bounties from the Government.

C. A. C. J.

#### Recent Course of the Russian Iron Trade.

During the last ten years, says the *London Iron and Coal Trades Review*, Russia has made great strides in the production of pig iron, more especially in the southern districts, and is now producing 85 per cent. of her own requirements. The total production of pig iron in Russia in 1890 and subsequent years has been:

Year.	Production. Tons.	Imports. Tons.
1890.....	926,590	.....
1895.....	1,452,420	.....
1896.....	1,621,100	75,216
1897.....	1,880,410	102,178
1898.....	2,219,850	99,819
1899.....	2,703,890	136,723
1900.....	2,875,000	51,728
1901.....	2,831,000	30,221

Of this output some 1,500,000 tons are produced in South Russia, which makes thus about 54 per cent. of the output. It will be observed that Russia, as a market for pig iron, has practically no existence. Indeed, exports of Russian iron were made to this country in the early part of the present year, although, of course, no

permanent trade of this kind is possible. The details of last year's output are as follows:

	Number of furnaces.	Output. Tons.
North .....	9	18,791
Urals .....	95	802,885
Center .....	37	178,622
South .....	19	1,506,384
Poland .....	22	324,766
Totals.....	182	2,831,448

The above total includes 30,000 tons of direct castings, of which more than one-half were made in the Urals. In 1901 the works belonging to the Russian Government only produced 115,000 tons of pig iron, so that practically all the output is now from the works of private firms.

The following table shows the principal firms engaged in the manufacture of pig iron and their respective outputs:

	Tons.
Hughes Works (Société Novorossiskl).....	249,511
Dniéper Works (Société Dniéprovienne du Midi de la Russie).....	221,929
Société Métallurgique Russo-Belge, Pierre Works.....	193,588
Alexandra Works (Société Méridionale Russe de Briansk).....	184,144
Droujkovka Works (Société des Forges et Aciéries du Donetz).....	106,570
Société Métallurgique du Donetz-Iourlefska.....	86,629
Société Métallurgique de Taganrog.....	78,362
Providence Russe.....	77,251
Huta-Bankova Works.....	75,161
Société Nicopol-Marlioupol.....	68,043
Fonderies d'acier de Makiefa Don Province.....	65,736
Oechoff Works.....	55,356
Kertch Works (Société des usines et mines de Kertch).....	53,014

The 1901 statistics for the manufactured iron trade are given in the following table. Of puddled iron the Government works produced some 10 per cent. of the total, but in finished iron this percentage falls to about 6 per cent.:

	No. of works.	Puddled Iron.—Tons.	Finished Iron.—Tons.
North .....	2	22,688	47,567
Urals .....	64	307,525	204,985
Center .....	15	65,606	47,454
South .....	1	1,334	479
Southwest .....	1	....	1,001
Poland .....	9	22,633	26,429
Totals.....	92	419,786	327,915

The output of steel in Russia has increased at a very rapid rate. The table which follows shows the output, in tons, in 1901. In addition to the totals given, about 30,000 tons of castings were produced, practically all using open hearth steel. There was also about 2000 tons of crucible steel produced. The Government works make no Bessemer steel, and only 2½ per cent. of the open hearth output:

	No. of works.	Open hearth.		Bessemer.	
		Blooms and billets.	Bars, shapes, plates, &c.	Blooms and billets.	Rails, shapes, sheets, &c.
North .....	1	99,641	111,858	13,296	.....
Urals .....	33	337,039	214,455	48,585	41,243
Center .....	9	184,978	154,111	.....	.....
South .....	13	571,917	257,132	555,616	440,294
Poland .....	8	236,937	247,292	.....	.....
Totals.....	64	1,430,512	984,848	617,497	481,537

The principal works producing steel ingots, blooms and billets, with their respective outputs, are given in the following table:

	Open hearth. Tons.	Bes- semer. Tons.
Société Dniéprovienne de la Russie méridionale.....	119,963	94,908
Hughes, Société Novorossiskl.....	88,576	60,292
Société métallurgique Russo-Belge.....	14,963	127,684
Société de la Russie méridionale de l'usine de Briansk .....	56,576	72,454
Société du Donetz (Droujkovka).....	32,268	74,201
Société métallurgique de Taganrog.....	32,467	61,292
Providence Russe.....	19,901	64,782
Société des Usines Octrovetsse.....	84,348	.....
Société des Usines Poutilof.....	57,138	13,295
Société de Huta-Bankova.....	62,436	.....
Société des Hauts Fourneaux de Bogoslov.....	58,812	.....

No one acquainted with the trade of Russia would deny that since the passing of the treaty of 1894 Germany has reaped a rich harvest in her trade with Russia, and if any doubt ever existed on this point, the following statistics of the imports of all kinds of iron im-

ported into Russia, taken from a German source, would alone be sufficient to put the matter in a clear light:

	United Kingdom. Tons.	Germany. Tons.
1893.....	248,000	90,300
1894.....	211,500	218,000
1897.....	206,000	321,000
1899.....	231,000	278,000
1900.....	133,500	150,300

These figures speak for themselves, and it is interesting to note that no sooner was the commercial treaty in force than the imports of German iron goods rose from 90,000 to 218,000 tons. The decrease noticeable in recent

### The Stephens-Adamson Belt Conveyors.

The belt conveyors built by the Stephens-Adamson Mfg. Company of Aurora, Ill., are especially adapted for carrying heavy and dusty material, such as ore, coal, sand, &c. They are dust proof and self lubricating throughout. The troughing rollers, Figs. 1 and 2, consist of a pocketed bracket sleeve on which the spindle of the roller revolves submerged in oil. The oil pot (which holds about  $\frac{1}{2}$  pint of oil), bracket, spindle, sleeve and rollers are all self contained and attached to the cross bar by wrought iron V-bolts. When the oil

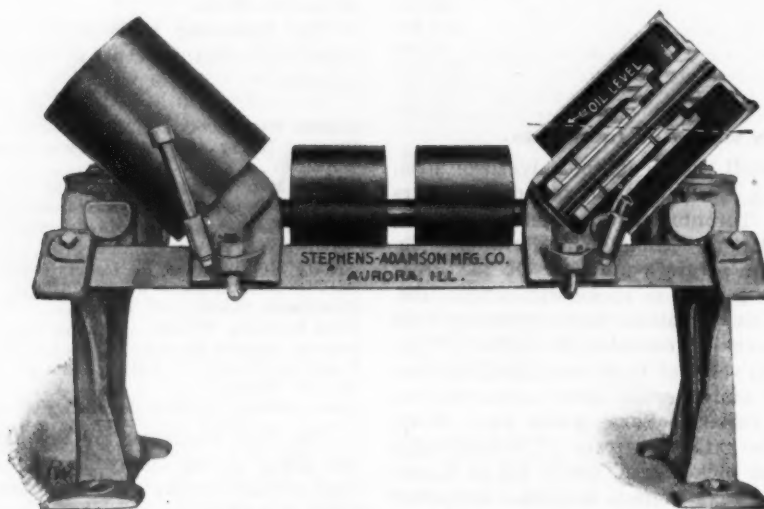


Fig. 1.—Troughing Roller in Section.

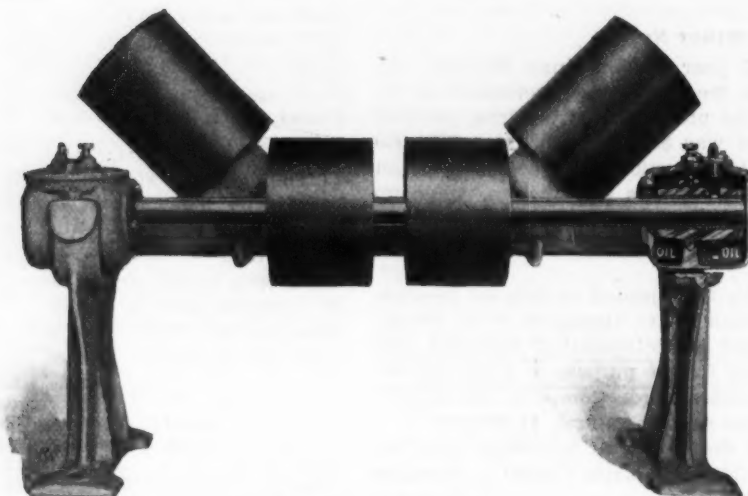


Fig. 2.—Bearing in Section.

### THE STEPHENS-ADAMSON BELT CONVEYOR.

years is no doubt traceable to the increased production of iron in Russia, as well as the lessened demand, owing to the crisis in the general trade of the country. So critical is the condition of things that within the past week or so a conference of 100 leading representatives of the trade has been held under the auspices of the Assistant Minister of Finance, to endeavor to remedy the present state of affairs.

The Ohio Iron & Steel Company, operating Mary Furnace at Lowellville, Ohio, have entered into an agreement with the Youngstown Iron Sheet & Tube Company for the development of coal lands in West Virginia purchased by the latter company and for the building of coke ovens. Robert Bentley of the Ohio Iron & Steel Company is largely interested in the Orient Coal & Coke Company of Pittsburgh, who will build a large number of coke ovens in the Connellsville region.

pots are once filled they will run for several months without attention. The supporting rollers are carried on oscillating ring oiling dust proof bearings, which adjust themselves to any settling of the frame work or building. For heavy materials these carriers are placed at intervals of 3 to 6 feet and for lighter material they are placed from 10 to 12 feet, alternating with straight rollers. They are made for all widths of belt and for any desired capacity.

In the direct pull take up bearings, Fig. 3, the upper side of the adjusting screw is within  $\frac{1}{8}$  inch from the bottom of the tail shaft, thus giving practically a direct pull on the tail shaft of the conveyor. As is well known, the adjustment is made from the end of the take-up and the pressure downward on the frame, or the binding tendency is in direct proportion to the distance between the centers of the take-up screw and the tail shaft of the conveyor; the improvement, therefore, in this design is

obvious. These take-ups are fitted with ball and socket bearings, either plain or with grease cups. The adjusting screws are of finished steel with square cut threads, full length; the supporting frame is of angle steel carried on cast iron saddles; the number of these required depends upon the length of the take-up. The adjusting mechanism is a lever and ratchet device furnished with each take-up or an ordinary hand wheel.

### The German Machinery Market.

Frank H. Mason, Consul-General at Berlin, writing to the Department of State, Washington, D. C., on "salable American products for Germany," has the following to say relative to the outlook for machine tools and machinery:

It is well known that Germany is now passing through a period of industrial depression, which has to a great extent restricted the erection of new manufacturing establishments which, during the period from 1898 to 1900, made such large demands on the purveyors of American machinery and tools. It is also true that those imported lathes, planers, milling and other machines have been used to reproduce themselves and to

metal pass between the rolls. It appears that none of the alloys now used for roll bearings are satisfactory, and as a German iron master said recently: "If your people have anything new and better than what we are using, they could sell a shipload of it in Germany."

There are also inquiries for American tool steel, the superior quality of which has been revealed by the vast number of American machine tools and implements now in use here. But there seems to be a difficulty in obtaining a supply, or even quotations, from the makers of such steel in the United States. It is also well known that certain grades of American steel specially adapted for the construction of dynamos and other forms of electrical machinery are superior to anything produced and used for the same purpose here. As long as there was a large export of American electrical machinery to Germany, there would be, of course, no object in offering such materials, but now that this country has become self supplying in that line, it may be worth while to cultivate and cater to the very tangible demand here for the specially prepared metals which are adapted to such manufacture.

Certain American firms, like the National Cash Register and Columbia Phonograph companies, who are

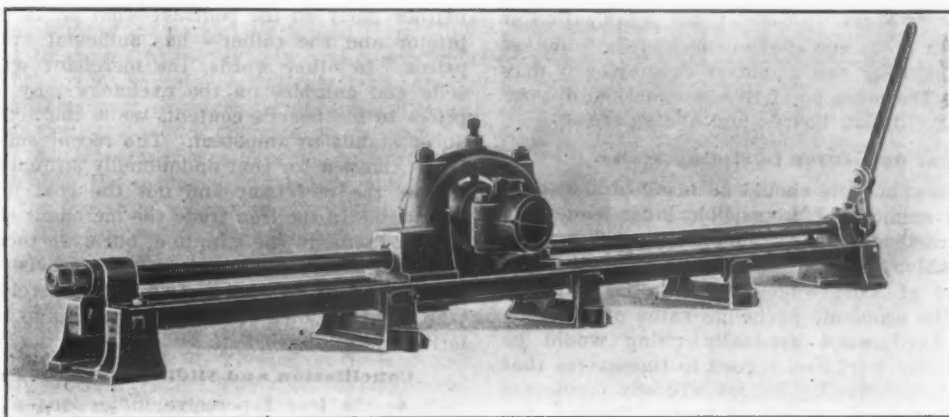


Fig. 3.—Direct Pull Take-Up Bearing.

### THE STEPHENS-ADAMSON BELT CONVEYOR.

make many kinds of machinery and tools so excellent in quality and cheap in cost, that Germany has become a self supplying exporter of many such appliances which were formerly imported from the United States. But while all this is true, there is still a demand for many special forms of machinery and other manufactures of iron, which is only apparent to those directly concerned in that class of trade. From a leading house of this class, whose specialty is the newer forms of American machinery, the following *résumé* of the more obvious recent demands has been obtained:

In Berlin and its vicinity there is a call for the most improved machinery for making bolts, screws, rivets and all that is included under the general category of boiler fittings. One firm will take six sets of such machinery, which must be of the latest and most improved construction. Steam pumps of a capacity to lift about 15,000 gallons per hour, with minimum outlay of power, would also be found salable in this country.

Machines for pressing oil from linseed, rape, sesame, palm and other oleaginous seeds and nuts, are understood here to be made of high efficiency and relatively cheap in the United States. So far as is known, the American machinery of this class has not been introduced here, and there would seem to be a promising field for it.

German rolling mill managers now use phosphor bronze, Babbitt metal, and brass for the bearings, or journal boxes, of rolls, which, as is well known, are subject to heavy frictional strain when large masses of

represented here by large and finely appointed branch houses, have attracted great attention by the originality, ingenuity and attractiveness of certain advertising devices which have been used in their show windows to draw the attention of the passing throng. In general, it may be stated that all such novelties adapted to advertising purposes, which are original and attractive, are in demand and will be found salable in this country. The same is true of many novelties for kitchen and household use, such as paring machines, carpet sweepers, wringers, ice cream freezers, naphtha stoves, &c.

Among the correspondence received here through the American Machinery Company of 74 Linden Strasse, Berlin, is a letter from a large and important firm in Warsaw, which has branch houses in Moscow, St. Petersburg, Odessa, and other trade centers, and does an extensive business throughout European Russia. The letter specifies in order the classes of machinery and various special kinds of apparatus which are now demanded by their Russian trade, for a supply of which they would gladly receive proposals from American manufacturers and exporters—viz., pumping and hoisting machinery, engines, boring and drilling machines for mines and blast furnaces, stationary and portable steam engines for factory and agricultural purposes, locomotives and threshing machines, gas motors, power pumps, equipment for grain elevators, slaughter houses, and steam laundries, complete apparatus for creameries and the manufacture of butter and cheese, steam heating and ventilating appliances, locomotives for small auxil-

lary railways, and wagons with automatic discharging devices for loads of grain, seeds and other finely divided materials. Catalogues, circulars or proposals concerning any of the above classes of merchandise will, if received here, be forwarded to where they will receive due attention.

### Sliding Scales in Great Britain.

Lord Beaconsfield, in a moment of inspiration, once remarked that if you would know the trend of trade watch the price of chemicals. The observation showed shrewd insight into the essential facts of commerce, but was not in itself particularly accurate. I am inclined to think that a more accurate gauge of market conditions is the success or failure of strikes and lockouts. On a rising market if the workmen resort to the strike the odds are in favor of their success; on a falling market strikes are apt to be unsuccessful and lockouts successful. But this test is fast disappearing, for the simple reason that both among employers and employed the strike and lockout are regarded as relics of more barbarous times and as quite unsuited to the peculiar conditions of present day commerce. With the growing complexity of manufacture comes a much more delicate and highly sensitized market structure, and it is realized that to break up the delicate organization of the market by a prolonged strike or lockout is to defeat the end which either the employer or employed may have in view. The outcome of this is a marked disposition toward conciliation boards and sliding scales.

#### Cause of Opposition to Sliding Scales.

In this connection note should be made of a distinct change in the opinions of responsible labor leaders as to the correct method of wage remuneration. Ten years ago the disposition undoubtedly was to struggle for a general system of fixed wages in all trades. It was thought that the economic exchange value of labor by means of a fixed wage gradually rising would be strengthened. The workmen argued to themselves that sliding scales were cunning dodges whereby employers reaped £2 out of every £3 gain in profit. Further, the men said that in essence wages must be a fixed charge upon all production, as fixed and immovable as rent. The policy of organized labor then was to abolish piece work prices of all sorts and substitute fixed wage conditions. They were further strengthened in this conviction by the perfectly human argument that a fixed average wage regularly paid was better than a higher average wage irregularly paid and subject to the whims of the market. But with the advancing tide of prosperity which began to flow in the year 1898 the workmen felt that they were not getting their share of the improvement, and accordingly further inquiries into methods of industrial remuneration shook to pieces this conviction as to the fixed regular wage and wages based upon market results once more became popular. In addition the success of piece work prices in the cotton industry of Lancashire and the boot and shoe industries of Leicester and Northampton showed conclusively that there could be no one fixed rule as to wage payment and that every trade must accommodate itself to its own conditions.

#### Automatic Machinery.

Another bugbear in the minds of the workmen was the fear that with a sliding scale they would be at the mercy of two forces in modern industry—namely, possible decreases in prices caused by the growing increase in the use of automatic machinery and increased physical effort caused by "speeding up" of machinery, an increased physical strain upon them for which they would receive no return in enhanced wages. It was freely urged that the employer being in complete possession both of the automatic machine and of steam power had the workmen at his mercy. Experience, however, has conclusively shown that these fears were ill grounded. The increased use of automatic machinery, while no doubt increasing output, has not apparently exercised much influence upon prices or market condi-

tions, but by means of combined committees of employers and employed, with expert advice and under impartial conditions, the workman has received payment for increased effort caused by "speeding up." All these influences and new conditions combined have between them rendered obnoxious the idea either of the strike or lockout. Parliament itself has recognized the change in sentiment by the passage some years ago of an industrial arbitration act, empowering the Government at the request of both sides to appoint an arbitrator to settle industrial disputes. This act goes even further and gives the president of the Board of Trade powers to appoint a conciliator to go down and if possible induce peace where the two sides are at daggers drawn.

But now there is a change in the commercial outlook and undoubtedly we are face to face with falling prices and a stagnant market. The result is that the workmen look suspiciously upon wages which, under sliding scale arrangements, fall automatically. To do them justice I may say at once that in the districts governed by sliding scales, with one exception, the men are loyally abiding by their contracts. The exception is the South Wales coal mining district, where the sliding scale is unpopular. The reason for this unpopularity is an interesting one, and may be mentioned because it shows vividly an essential weakness in present market conditions. In a nutshell, the objection to it is because neither party to the contract—that is, the colliery proprietor and the collier—has sufficient voice in fixing prices. In other words, the merchant who buys and sells and gambles on the exchange may bull or bear prices to his heart's content, while the actual coal producer stands by impotent. The recent sudden demand from America for coal undoubtedly stiffened prices but it was the merchant and not the coal producer who benefited. In the iron trade the merchant is not so powerful a factor in the situation, but even there both iron master and iron merchant may be seriously affected by the operations of one or two large merchanting firms who, for their own reasons, may resort to highly speculative operations.

#### Conciliation and Sliding Scales in Practice.

None the less I perceive indications of uneasiness. Both employers and employed are talking about falling prices and are discussing what to do next. It may be that the various sliding scale schemes and conciliation boards will pass through the next five years unscathed and possibly with increased powers; on the other hand, there may be a sudden revulsion among the workmen toward the fixed wage notion and a general breaking up of this class of industrial organization. It will be remembered, however, that in the iron trades two conciliation boards, whose operations are based upon the system of the sliding scale, have been extraordinarily successful in maintaining peace and regulating wages over a period of 30 years. Going back to the year 1866, there may be many who remember the fearful strike in the North of England which for six months left the works idle and caused great misery and starvation. The only happy issue of that strike was the formation by Sir David Dale (then Mr. Dale) of the Board of Conciliation and Arbitration, which was finally embodied in 1869. It has had its ups and downs, but success has come to it. Springing from this Board of Conciliation came the Midland Iron and Steel Wages Board.

Daniel Jones, secretary of the South Staffordshire Ironmasters' Association and employers' secretary upon this Midland Iron and Steel Wages Board, has recently been lecturing to the students of Birmingham University upon the advantages of conciliation in the iron trade. He drew a marked distinction between the municipal and other conciliation boards and his own, the great difference lying in the thorough organization of the latter, by which every works had a representative chosen by the operatives employed there, the employer being, of course, his own representative. Thus every man was identified with the board and was a subscriber to its cost, and looked to it as his protector and the regulator of his wages. It was a principle that no cessation of work should take place pending a dispute, as the decisions of the standing committee could be made

retroactive. The operatives had announced their willingness to encourage the introduction of any new machinery or process, leaving the board to assess a fair wage.

He pointed out the great difference between an occasional arbitrator and one who was permanent, as was the president of a wages board, the latter having at his hands a large amount of information from the accumulated statistics, minutes and decisions of the board which were not available where such an institution did not exist. He reviewed the difficulties of establishing a wages board 30 years ago and compared them with the conditions of to-day, when the operatives have received a training on the standing committee and were qualified in many cases to act as operatives' secretaries. The employers encouraged their men to become members of the ironworkers' association. Without organization of this kind a wages board could not be worked. The union men were the steadiest and more amenable to control, and as long as they had conscientious and sensible officials at the head of the union it was a desirable institution. He remarked upon the danger of admitting sectional organizations, such as boiler makers, engineers, &c., into the working of the board. Each of the 25,000 men the board controlled must look to the principal board and not to subsidiary ones. The effect of this widespread organization was that each individual workman knew that he had a tribunal to which he had a right to appeal to rectify any real grievance or proper subject for investigation. The result was that suspicious and imaginary wrongs disappeared. There was nothing in the nature of a delegate on the standing committee. Each member was expected to form his own judgment upon the evidence laid before him. He was not to be the bearer of a decision given by a mass meeting which had not heard the evidence. He had known an employer to leave the board because a decision was not in his favor, but he had never yet known a workman to leave.

The sliding scale, which was only an adjunct of the board, was formulated by G. B. Thorneycroft, Wolverhampton, about 30 years ago. The total expenditure amounted to from £800 to £900 per annum, but that was a small amount as compared with the loss that would follow strikes and other disturbances. The decisions of the board were enforced merely by the recognition on the part of the parties that there was a mutuality of interest between employers and operatives and the confidence which was felt in the board. The operatives also observed the decisions because they saw that higher wages could not be paid than were paid in competing districts. As an instance of the success of the board he mentioned that in nine years they had only had to refer one matter to the president of the board. In the old days the board might have been compared to a "buffer state" between two antagonistic parties; to-day it was a link of mutual interests.

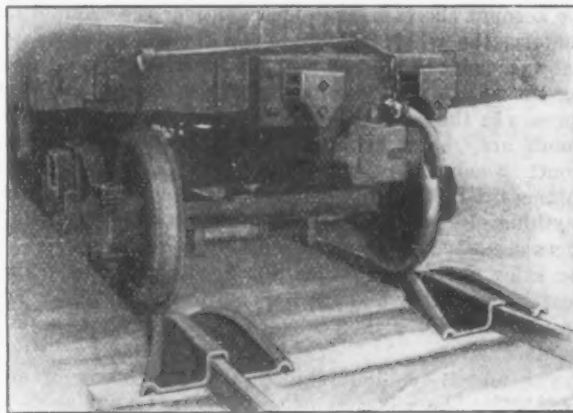
#### The Conciliation Boards Justified.

An ounce of fact is worth a ton of theory, and we may therefore take it that the two great conciliation boards in the iron trade of this country have more than justified their existence. The frank recognition of organized labor among the employers of this country is a fact which should be noted by American employers. I am convinced that the sooner responsibility is thrown upon organized labor the sooner will it lead to industrial peace, which with average tact and discretion on both sides may become permanent. Nothing is more encouraging to the observer than to watch the growth of a more or less irresponsible trade union secretary into an industrial statesman by being compelled to carry on his shoulder a heavy burden of responsibility. The first necessity to achieve this end is to treat the trades union leaders with sympathy and respect. The engineers themselves have accepted a premium bonus scheme which is, after all, a variation of a fixed wage theory to which the engineers were committed. This end has been brought about by the growth in power and responsibility of the present secretary of the Amalgamated Society of Engineers, who is now in your country on the Mosley Commission.

S. G. H.

#### The Pritchard Pressed Steel Car Replacer.

The car replacer made by the Portsmouth Pressed Steel Company of Portsmouth, Ohio, is so designed that it covers the rail its entire length, and has its bearings upon the lower flange of the rail, thereby binding the top or T of the rail and making it impossible for it to turn unless the rail turns. This makes it as solid as the rail itself. The replacer rests upon the tie only at the rear or broad end of the outer edge of the wings. These wings lift the wheels upon the inside of the track to a proper height, the flange at the same time shearing the wheels toward the rail, and placing the treads of the wheels over the rails. This is accomplished by moving the car 24 inches. The heels and lugs prevent the replacer from moving forward. The outside lugs press



THE PRITCHARD PRESSED STEEL CAR REPLACER.

into the tie while the inside ones hook upon the rail spikes.

#### Canada's Import Trade.

Canadian imports from the United States continue to grow more rapidly than those from the United Kingdom, despite the legislation of 1897 in favor of products of the United Kingdom. In that year the Canadian tariff laws were so adjusted as to give an immediate reduction of 12½ per cent. in tariff rates on imports from the United Kingdom, with a further provision that another 12½ per cent. reduction should occur in 1898. In 1900 a still further reduction was made, making the total reduction 33 1-3 per cent.

The official report of Trade and Navigation of the Dominion of Canada shows that in 1896 Canadian imports from Great Britain were \$32,979,742, and in 1902 \$49,206,062, an increase of \$16,226,320. In 1896 the Canadian imports from the United States were \$58,574,024, and in 1902 \$120,814,750, an increase of \$62,240,726.

Not only do Canadian imports from the United States show a greater actual increase from 1896 to 1902 than do those from the United Kingdom, but the percentage of increase in imports from the United States is also greater than that in imports from the United Kingdom, and the percentage which imports from the United States form of the total imports of Canada is greater in 1902 than it was in 1896, while the percentage which imports from Great Britain form of the total imports of Canada is less in 1902 than it was in 1896. The imports into Canada from Great Britain show an increase of 53 per cent., while those from the United States show an increase of 107 per cent. since 1896; imports from Great Britain formed in 1896 30 per cent. of the total imports into Canada, and in 1902 24 per cent.; while imports from the United States, which in 1896 formed 52 per cent., formed in 1902 60 per cent. of the total imports into Canada.

The American Machine Mfg. Company, Boston, Mass., have been organized to manufacture spark plugs for automobiles at 549 Atlantic avenue. Samuel Butter of Boston is treasurer.

### Logical Manufacturing Accounts.

BY SEYMOUR WALTON, CHICAGO.

A set of books is supposed to contain a history of the business to which they belong, and to exhibit its condition from time to time. As books are ordinarily kept, this is true only in a partial sense, applicable solely to the cash income and outgo. In other respects, the books are not a true history of the business and do not exhibit a true condition. This can be shown by an analysis of the trial balance of any manufacturing concern. Starting with the balance sheet at the beginning of the year we have a true statement of assets and liabilities, but at the end of the first month we find an exhibit of balances that is totally incorrect. Raw material has been charged with all the goods bought during the month, and the account shows a large increase over the original inventory, the whole account being carried as an asset. Labor account is charged with all the pay-rolls paid during the month and also figures as an asset, or at least appears in the asset column. All the other expense accounts are treated in the same way, and we have from month to month a constantly increasing amount of debit balances, which do not in any way represent assets or anything else on hand. That these fictitious debit balances are offset by an equally fictitious credit balance in the sales account does not serve to make things any clearer, but rather adds to the confusion. This is what may be called the illogical method of treating the accounts.

The logical method requires that the books of account should be a history of actual transactions as they occur, and should show the true condition of affairs at all times and not at the end of the year only. Starting with the raw material, we have the original inventory which represents material actually in the storehouses. As new material is bought it is put into the storehouse and is charged on the books. As material is drawn out of the storehouse it goes into manufactured product in fact. The logical mind demands that it should go into manufactured product on the books also, if the books are to be a true history of the business. Labor goes directly or indirectly into the product in the factory. There appears no reason why it should not follow the same course on the books in the office. All the outgo of the business is made for the sake of manufacturing or selling the product. None of it remains on hand from month to month, except the material and supplies, including in the latter unexpired insurance, advertising matter and similar items. The logical method requires that none of it should appear as a balance on the books except that actually on hand and that the latter balances should represent as nearly as possible the value at original prices of the material in the hands of the storekeeper, subject to verification and correction when the inventory is taken at the stated time.

Broadly stated, this is the logical idea, but it is capable of much more extended application by a subdivision of the product into classes, for each of which an accurate history is provided, showing the amount of material consumed and labor and expense incurred. All manufacturers attempt to reach this result, but they usually do it by a series of independent figures which do not enter into their books of account and are not made to balance to anything. While more or less accurate they cannot be depended on, since there is no check on their truth, as there would be in case they formed part of the regular books and appeared on the trial balance.

It needs no argument to show that such a method of treating manufacturing accounts would be much more valuable than the crude methods now generally in use. Being a true history of all transactions, it would show the actual amount of material, labor and expense that had gone into each species of the product, whether finished or unfinished, and the amount of raw material or partially manufactured material that should be on hand. A manufacturer with such information at his command would have a much more intelligent idea of his busi-

ness than he can now gain from figures which may or may not be correct, since they are at best only estimates or are based on past experience the elements of which may have changed without his being conscious of it. In case the factory is destroyed by fire the advantage of exact information will be very manifest in the adjustment of the loss with the underwriters.

Modern methods have simplified the work necessary to obtain this exact information, so that it can frequently be arrived at with less expense of time and labor than is now involved in the prevalent crude and unsatisfactory methods. No universal system can be devised that will fit every manufacturing plant alike. Such a system is similar to the patent nostrum that is guaranteed to cure all diseases. Each plant requires careful study by a person who has made manufacturing accounts a specialty and can recommend such changes in the existing methods as the needs of the particular factory would indicate.

To the ordinary business man or manufacturer it seems impossible that any one person can assume the responsibility and keep in touch with the details of the enormous mass of transactions arising from the wonderful commercial developments of to-day. Unaided he would be unable to do so, and he therefore calls to his assistance the trained accountant whose years of varied practice and continuous study of every species of business problems fit him to give the manufacturer the benefit of a highly developed analytical mind and a knowledge of general principles by which he can institute proper methods of analyzing and dealing with any of the details of the business and of tabulating them in such a manner that intelligent and valuable information is easily and concisely arrived at. The responsible head of the concern is thus in constant possession of exact information available not only for his own guidance, but for placing the facts before his directors or stockholders at any time desired, without the necessity of waiting until the end of the year.

This intimate and exact knowledge of the conditions of the business enables him to increase his profits by taking advantage of the markets, both as regards the purchase of materials and also the management of his sales.

The progressive and successful manufacturer realizes and takes advantage of the valuable knowledge that the practical and skilled accountant has to give him. He knows that the experience of the accountant has been much more varied than his own has been, and that in meeting and solving difficult problems in the work to which he has devoted his best energies, he has absorbed and retained many points that would be likely to escape his own observation, and that he is therefore enabled to decide logically and without prejudice as to the best course to pursue and the best methods to use in arranging accounts to secure accurate and progressive analysis, to supervise and, when needed, to tabulate results for the information of his client.

**Hulett Ore Unloaders at Detroit.**—The Detroit Iron & Steel Company have contracted for the installation of Hulett automatic unloaders at their plant on Zug Island below Detroit with the Webster, Camp & Lane Company, Akron, Ohio, manufacturers of the Hulett machinery. The output of the Detroit company's plant is estimated at 300 tons per day, requiring approximately 200,000 tons of iron ore in a season. The ore unloading plant will consist of two bridges of 196 feet span with a 50-foot cantilever extended over the ore bins near the furnace and with a boom extending over the vessel. The boom is lowered in operation over the boat, and the ore removed by a two part automatic bucket of 5 tons capacity suspended from a trolley, carried back and dumped into a railroad car, stock pile or other convenient place. About 45 per cent. of the cargo can thus be easily reached by the bucket and removed, but the remaining quantity of ore under the decks has to be first brought under the hatch by means of an automatic scraping device. This scraping device is under the control of one man and can be operated in one part of the

vessel while the automatic bucket is working in another. Both machines are electrically driven. It is anticipated to attain a speed of 200 tons per hour with each of these machines.

### The New Fitchburg 72-inch Lathe.

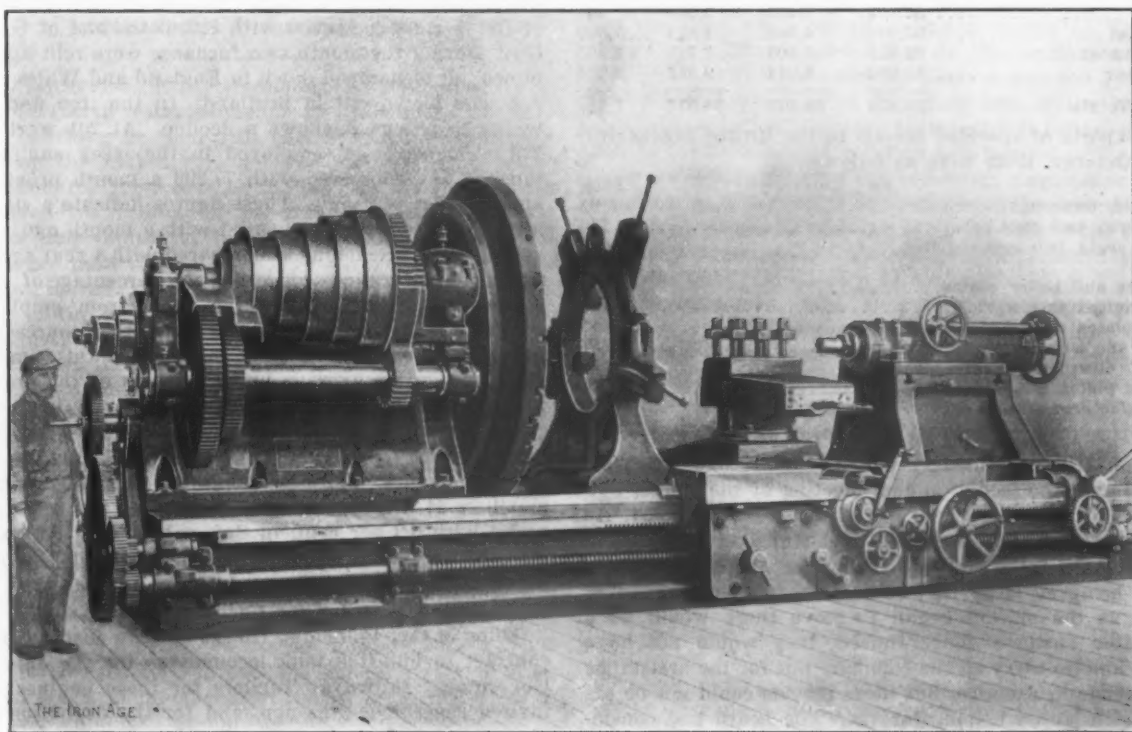
The new Fitchburg 72-inch screw cutting engine lathe is especially designed for doing heavy work and is adapted to the use of high speed tool steel. The head stock is extra heavy, triple geared, and swings 47 inches over the carriage. The spindle is made of high grade hammered steel running in boxes of bronze metal and alternate strips of babbitt. The front bearing is 10 inches in diameter and 15 inches long; the back bearing  $7\frac{1}{2}$  inches in diameter and  $13\frac{1}{2}$  inches long. The cone is mounted separately on a steel spindle and has five steps for a 5-inch belt, the largest step being 30 inches in diameter. The cone with the back and triple gears will give

The bed is so constructed as to give the greatest possible strength with box cross ties 2 feet between centers and a box longitudinal tie running its full length. The weight of the machine, with 25-foot bed, is 56,000 pounds. This lathe is built by the Fitchburg Machine Works, Fitchburg, Mass.

### The Youngstown Mfg. Company.

The Youngstown Mfg. Company, says the *Youngstown Telegram*, were incorporated in July, 1901, and after due investigation of sites located their works on one of the finest tracts in Mahoning County at Struthers, Ohio. There they built a first-class modern shop for the manufacture of bolts and rivets. The buildings and equipment are substantial and of the highest quality in every way. The Pennsylvania Railroad has easy access to the works, and the Pittsburgh & Lake Erie Railroad is constructing tracks into it.

A fine new 10-inch merchant mill has just been in-



THE NEW FITCHBURG 72-INCH LATHE.

15 uniform changes of speed, ranging from 1 to 148. The internal gear is cast solid with the face plate. The teeth are planed from the solid and mesh with a steel pinion on the cone spindle. The face plate is keyed to the main spindle and provided with T-slots for convenience in clamping work; four of these slots are finished to receive chuck jaws if desired.

The tail stock is very heavy and provided with a trip underneath which connects with the center tie of the lathe bed and holds it in a rigid position. It is also provided with means of quick adjustment forward or back, and the top section can be offset without unclamping the tail block from the bed. The tail spindle can be operated from the front end of the tail stock by means of the hand wheel shown. The steady rest is massive in construction, with an opening of 30 inches, and is fitted with five jaws.

The carriage is furnished with compound rest which has power angular feed in all directions. It also has, in addition to the regular V-bearing, a long flat bearing surface which prevents any liability of chatter. It is also provided with a binder which is used when operating cross feed. The tool is rigidly held by straps and bolts. The double apron gives the maximum strength and prevents any twisting strain on working parts. The lead screw is  $3\frac{1}{2}$  inches in diameter, 1-inch pitch.

stalled for the manufacture of material for the shops, and a small surplus will be put upon the market. On this mill will be made angles, channels and shapes generally, as well as rounds and flats within the range of a 10-inch mill. The mill was designed by S. V. Huber & Co.

The especial products of the Youngstown Mfg. Company are machine and carriage bolts, track bolts, lag screws, boiler and structural rivets, hot pressed nuts, iron and steel bars and shapes. The main object in making the plant such a complete one in every way, from the manufacture of the raw material into the finished product, is that the company may know just the kind of stock that is going into their product, as well as a matter of economy.

The officers of the Youngstown Mfg. Company are: President, Edwin McEwen; vice-president, S. B. E. McVay; secretary and treasurer, Whitney Warner. The Board of Directors is composed of the following: R. C. Steece, A. E. Adams, C. H. Booth, R. Bentley, Hugh B. Wick, Thomas McDonald, Edwin McEwen, S. B. E. McVay and Whitney Warner.

The production of the gold mines of the Rand in South Africa reached 181,439 ounces in October, as compared with the maximum of 459,709 ounces in August, 1899.

## Notes from Great Britain.

### Shipments to America.

LONDON, November 15, 1902.—The month of October showed a distinct fall in the exports of pig iron to America, but none the less the figures run to money and should be noted. I therefore append a statement of metals, including pig iron, shipped to America from this country during the month of October. Before giving this, however, a full statement of pig iron shipments to America this year, month by month, may help to make the position clear. I therefore have extracted the figures for each month down to October and have added the shipments to Canada. The result works out as follows:

	United States.		Canada.	
	1902. Tons.	1901. Tons.	1902. Tons.	1901. Tons.
January .....	7,134	861	505	126
February .....	2,708	2,133	425	70
March .....	14,845	1,829	350	...
April .....	7,720	4,130	3,215	518
May .....	23,177	4,651	2,010	485
June .....	26,319	6,497	5,605	1,136
July .....	52,192	3,293	3,986	240
August .....	69,970	4,563	4,824	1,000
September .....	69,827	5,408	7,740	1,365
October .....	55,003	3,014	9,357	2,537
Totals .....	328,895	30,379	38,017	7,519

Exports of specified metals to the United States during October, 1902, were as follows:

	Tons.
Copper, unwrought.....	43
Old iron and steel.....	710
Bar, angle, bolt and rod iron.....	642
Rails .....	2,867
Sheets and boiler plates.....	20
Galvanized sheets.....	117
Tin plates and sheets.....	4,645
Cast and wrought iron.....	257
Steel, unwrought.....	3,765
Black plates for tinning.....	3
Manufactures of steel.....	39

### The Nickel Corporation.

Col. Millard Hunsiker has for the second time presided over the second annual meeting of the Nickel Corporation, but there was little progress to report. In the course of his remarks Colonel Hunsiker said that at the present there was no market for nickel, the stocks held being so large that there were no buyers, but so soon as the market began to move there would be a profitable business done. Indeed, they would not have been able to carry on the company but for the assistance of friends in America, but these friends could not be expected to go on helping forever. The board had considered the question of reconstruction with a call per share, but of the 2600 shareholders 751 held five shares and less, 619 held from six to ten shares, and of the total number 2409 were original shareholders. One-half of their shareholders had small holdings, and to them a call would be a great hardship. Debentures were not thought feasible, as they would be only an additional burden on the company. Dealing with the mine, he said it was now fairly equipped and in good working order, only waiting for an opening in the market. They had dispensed with a managing director, and they had prevailed on A. H. Wiggin (Birmingham) to join the board. Concluding, he declared most emphatically that the United States Steel Corporation had no interest whatever in the Nickel Corporation, and had no intention of becoming cointerested.

### Mono Rail Projects.

I hear that Parliament will next session be asked to sanction two railways on the Mono rail principle, from London to Brighton, and from London to Dover. The engineers of the line are F. H. Behr, the inventor of the Mono rail, and R. Elliott-Cooper, who acted in conjunction with F. H. Behr, in the promotion of the Manchester & Liverpool Electric Express Railway, which secured the consent of Parliament in the session of 1901. The length of the time to be occupied in the journey from London to Brighton is to be 25 minutes, and the journey to Dover is to take 40 minutes. It is expected by the syndicate which is constructing the Manchester & Liverpool Electric Railway that a section of that

line in the neighborhood of Warrington will be completed and a train running on it by June next. Of course the railway companies affected by these proposals will oppose in the House of Commons for all they are worth.

### Markets, and the State of Trade.

LONDON, November 22, 1902.—Trade continues to show a lack of buoyancy, and the outlook is no more promising. Pig iron is coming down in price, and there is little new work being given out. Consumers are pressing for reductions in the price of bars, now that the American demand is either being regularized or slackening off. I think it may be said without doubt that American orders for pig iron are diminishing, both in number and volume. Unmarked bars are at the present time of precious little value, and although the standard rate is £6 10s., it is comparatively easy to buy at considerably under that price. A useful index to the state of trade is the condition of the labor market. During October there were 15,720 engaged in iron mining work an average of 5.78 days per week, as compared with 5.81 days in September. In pig iron at the works of 114 ironmasters, there were 324 furnaces in blast at the end of October, as compared with 325 at the end of September. During the month two furnaces were relit and two blown out or damped down in England and Wales, while one was blown out in Scotland. In the iron and steel works employment shows a decline. At 201 works 76,273 workmen were employed in the week ending October 25, as compared with 77,296 a month previously, and 79,889 a year ago. These figures indicate a slackening in production, as compared with a month ago, and a very distinct slackening as compared with a year ago. So far as general trade is concerned the percentage of unemployed based on 2391 returns (1184 from employers, 608 from trades unions and 599 from other sources) is 5 per cent., showing a distinct increase on this time last year, and on the average unemployment of the previous ten years. The percentage of unemployed in the engineering and metal trades is exactly 5 per cent., compared with 3.7 per cent. in October, 1901. In the shipbuilding trades, the percentage of unemployed union members at the end of October was 10.6 per cent., compared with 9.2 per cent. in September. The percentage for October, 1901, was 4.2 per cent. Clearly the shipbuilding industry is at the present moment in a bad way.

### Order for Locomotives.

Dubs & Co., Polmadie, Glasgow, have just secured a contract to build 30 tank locomotives for the Japanese Government railways. Tenders for these engines were invited several months ago, and for the first time German builders were requested to estimate. American firms were, as usual, also included in the invitation, and competition for the order was very keen. Dubs & Co., however, made a special effort to obtain the contract, especially in view of what has recently appeared in the press with regard to British vs. German and American engines, and they have the satisfaction of having beaten both German and American competitors. Three German and five United States firms tendered, in addition to which Neilson, Reid & Co., and Sharp, Stewart & Co. of Glasgow, and Beyer, Peacock & Co. of England also submitted offers.

### Watching the Indian Market.

The German Government proposes permanently to appoint a commercial commissioner for India, with his residence at Calcutta. He will be distinct from the consul there, and be expected to make a study of, and report upon, by telegraph if necessary, India's requirements as far as they might be met by German manufacturers or exporters. Being a commissioner he will not require or possess any diplomatic standing. I can only add to this interesting piece of information that unless the American Government wakes up and does something of the sort, it cannot fail to affect prejudicially the potential trade interests of American exporters. I am never tired of stating that India is to be one of the richest markets of the future.

### Narvik Iron Ore.

Professor Vogt has recently published an article relating to the iron ore at Narvik, Norway, which will, in the very near future, with the completion of the Ofoten Rail-

way, become a very important industry. He states that already iron ore obtained from the mines at Kirunavara and Luossavara, both in Sweden, has been exported from Narvik. In many places in Ofoten, such as Blaafjeld, Strand, Bergvik, &c., considerable deposits of ore, which can be transported very cheaply, have been discovered. This ore, however, it is said, does not contain more than 40 per cent. of iron, but lends itself to smelting in combination with the Swedish ore, which, it is said, is richer in iron.

#### Canadian Pig Iron for Glasgow.

It is curious that while we are exporting pig iron to America, Glasgow is actually importing Canadian pig iron. The steamer "Hestia" is sailing from Sydney, Cape Breton, with 3500 tons of Dominion pig iron. The shipment is in part payment of an old contract. On the face of it it looks as if there is considerable waste or freightage. I dare say it would be almost as cheap to ship the Canadian pig iron to Glasgow as from Cape Breton to Philadelphia.

S. G. H.

#### Indianapolis Industrial News.

INDIANAPOLIS, IND., December 1, 1902.—The local manufacturing establishments are all busy, most of them working to their full capacity and handicapped only by the inability to get raw material and transportation for their goods. Unless there should be an unlooked for falling off in trade during the present month the volume of business at most factories will be larger than that of last year and consequently the largest in the history of manufacturing in this city. Some of the manufacturers complain that the advance in the cost of raw materials has too far outrun the prices realized on the finished product, but others say they have found their customers willing to pay good prices for good goods and there has been no trouble to make profits. Nearly all factories are behind orders, and a large proportion of them have had to increase their capacity. Few clouds obscure the bright outlook for next year.

The Tucker & Dorsey Mfg. Company, hardware and wooden ware specialties, have had a shut down for two weeks, in order to install a new engine, two new boilers and a water heater and purifier. They have just completed a two-story brick addition, 70 x 120 feet, to be used for the packing, shipping and painting departments. The offices will also be transferred to the new building. Steam heating equipment has been installed throughout the factory; also an automatic sprinkler. The company have put in a tinning and galvanizing plant, a 75,000-gallon cistern with a 750-gallon pump, and a tank on a steel tower with a capacity of 30,000 gallons. An automatic nailing machine and a rip saw are among the new machines. The total improvements have cost the company \$45,000. They have doubled the factory's capacity. The company have had a good year, the trade on slaw and kraut cutters during the summer being unusually heavy. Best quality goods have had readiest sale and the margin of profit obtainable has been satisfactory. The export trade takes 15 per cent. of the factory's output. Orders are now being filled for Liverpool, Rotterdam and Naples. The company are more than a month behind orders.

The Chandler & Taylor Company, engines and boilers, report steady trade. The volume of business for the year will equal, if not exceed, that of last year. Prices have been satisfactory. The addition of the old foundry building to the machine shop made necessary the installing of much new machinery. The new foundry building in Rosedale addition, across White River, will be followed next year by the boiler shop, and in 1904 the machine shop and office buildings will be erected on the new site. There are 21 acres in the new site as compared to 3 at the present location. Said Mr. Taylor: "We want to avoid the usual situation that confronts manufacturing concerns when they are ready to expand. Having made the surrounding land valuable by the establishment of a factory, companies are compelled to pay exorbitant prices for what they may

want of it for the enlargement of their plant." The new factory will have the Big Four and Pennsylvania tracks at its doors. Among present shipments being made is a saw mill outfit for the interior of the Tehuantepec region in Mexico. This has to be shipped in parts, no piece to weigh more than 300 pounds gross, nor to be more than 8 feet long. It has to be carried from the port to the interior on the backs of mules. The restriction as to length is made so that no difficulty may be encountered where there are sharp turns in narrow passages among the cliffs.

The Wagner Plow Company, who moved from Vernon, Ind., in March, to a group of well situated, roomy brick buildings specially erected for the company in Indianapolis, say the move has proved to be a beneficial one. Business so far has exceeded that of any similar period heretofore, and the company have been in the plow business since long before the Civil War. To encourage the company in their contemplated removal, Indianapolis people took \$50,000 of stock. Some of them are now asking for more. Unexplainable and unfounded rumors recently appeared in some daily newspapers that the company were contemplating a return to Vernon. They are putting a new plow on the market, a gang disk plow, and have accepted some orders for January delivery. They exhibited this plow first at the Vehicle and Implement Exhibit at Cincinnati. It is made with one to three disks and right or left handed. The company have been making the reversible single disk plow since June. The factory equipment for the manufacture of disk plows shows that the company believe the newer plow has come to stay. The company will enter Ohio for business next year—a new field.

The Rockwood Mfg. Company report unsurpassed business for the year and the foundry running to its capacity. They have a limited line of big customers who take the entire output. While the volume of trade has been large the company have been unable to get an advance in prices on the finished product approaching that on the raw material.

The Indianapolis Foundry Company are adding two brick buildings, each about 40 x 100 feet, to their plant, which will increase the capacity 25 per cent. They have all the business they can handle, but have had to struggle against great difficulties in getting pig iron and coke.

The Capital Thermotor Company are busy. They are putting on the market a new four-cycle type throttle governor engine with very close regulating, the voltmeter showing a variation of not more than 1 per cent. They are 8 to 100 horse-power. The company's specialty heretofore has been 1 to 3 horse-power gas and oil engines. Henry Pokorney, formerly superintendent of the E. R. Thomas Motor Company and for Fair & Trefts of Buffalo, is now with the Capital Thermotor Company. It is said he is the designer of both the smallest and largest gas engines ever made.

The T. B. Laycock Company, manufacturers of iron beds, having just completed the erection of a \$20,000 brick addition to their plant, have begun another, to cost half that amount. This latter will be used as a foundry. It is 100 x 140 feet. October was the biggest single month in the company's history. The year's business will show an increase of 10 per cent. The company have orders ahead until next July.

The American Buncher Mfg. Company and the Pneumatic Elevator & Weigher Company have been consolidated and new one-story brick buildings will be added to the present plant of the latter company. The consolidation will retain the name of the Pneumatic Elevator & Weigher Company.

The Piel Bros. Starch Works are erecting an independent plant at Drover street and the Belt Railroad, to cost \$250,000. The buildings will cost \$100,000.

Frederick E. Saward of the *Coal Trade Journal* is quoted as crediting the heavily increased production of bituminous coal in recent years to the mining machine. In the ten years from 1891 to 1901 the machine mined product increased from 8,000,000 to nearly 60,000,000 tons per annum.

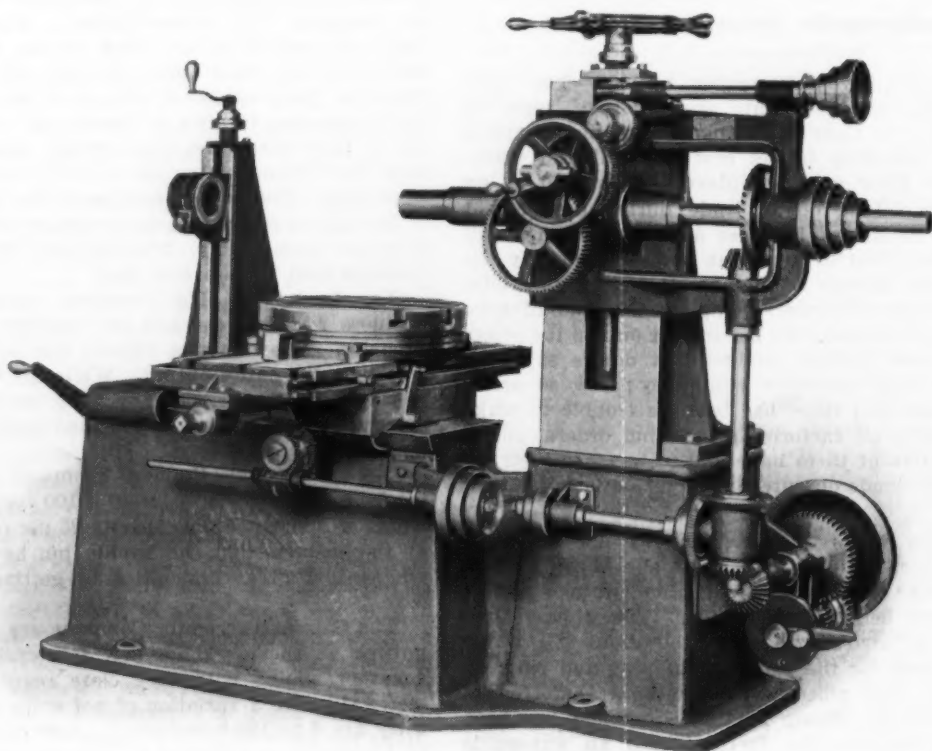
### The Franklin Tool Room Boring Machine.

While, as the name implies, this machine was designed especially for all around service in the tool room, it is constructed rigidly and heavily enough for use in the shop for accurate boring, facing and milling. The crucible steel spindle is 2 inches in diameter. There is a wide range of feeds for boring and drilling, and a milling feed to the table provides for milling any quality of material. The gears are cut from steel castings and are of ample strength for any work within the capacity of the machine. The circular table may be easily placed on or removed from the table, and is accurately graduated and aligned for work of great precision. The lifting screw is furnished with a dial for micrometer adjustment of the spindle head, so that milling cutters can be set to any required depth. The driving cone has three steps and with the back gearing gives six changes of speed. There are four changes of milling feed to the

ble cylinder, double acting upright engines, this type being selected to secure the maximum power in limited space. The Buffalo Forge Company are building all the fans and engines for this equipment.

### New Electric Power Transmission Developments in California.

The Northern California Power Company, who furnish power to a great variety of industries in one of the most prosperous sections of California, have recently installed a 4000 horse-power generating plant at the Cow Creek Station, which is situated in the high Sierras, and is typical of the many transmission plants which have recently been installed in California. The ultimate capacity of the station will be 8000 horse-power when the demand for power reaches this amount. The company have already installed 3000 horse-power at another gen-



THE FRANKLIN TOOL ROOM BORING MACHINE.

table for each speed. This machine is built by the Franklin Machine Works of 1231 Callowhill street, Philadelphia.

### A Unique Mechanical Draft Plant for the St. Louis Fair.

The mechanical draft feature of the Union Electric Light & Power Company's plant, which will be used for lighting the World's Fair grounds at St. Louis, will be an installation of unusual interest to engineers. The plant is to be equipped with both forced and induced draft apparatus, which is unusual. There will be 26 boilers of 700 horse-power each, equipped with automatic stokers. Fans will be used for the forced draft, and the boilers will also be operated under induced draft. The forced draft fans will be four in number, of the full housing style, size 160 inches. They will be driven by 10 x 10 vertical engines direct attached. The induced draft fans will be two in number, of a size quite in keeping with the basis upon which the exposition is being built, the wheel diameters being so large as to be seldom met with in mechanical draft engineering. Each of these induced draft fans will be of the full housing type, size 230 inches, and will be driven by 9 x 10 dou-

erating station, known as the Battle Creek Station, thus making the present total capacity of the company's electrical installation 7000 horse-power. Among the industries supplied with power by this company are ore smelters, the city water works at Red Bluff and Redding, and the operation of large air compressors at the Mountain Copper Company's mine at Iron Mountain. For lighting current is also furnished to the cities of Redding, Red Bluff and Willows, and the towns of Keswick, Cottonwood, Anderson, Corning and Vina. These towns lie along the Sacramento River and are located in one of the most fertile valleys in California. Irrigation is necessary on most of the land in this valley and electrically driven centrifugal pumps are employed to raise the water to the irrigating ditches. This cheap method of placing in the hands of the farmer the ability to obtain water away from streams and creeks has made him independent of the great water companies, and has rendered it possible to develop large areas of land which would otherwise be practically desert wastes. Many thousands of motors are already in operation in California driving pumps for irrigation work, and immense developments are yet to ensue from this application of electric power. The apparatus which the Northern California Power Company have recently in-

stalled in their Cow Creek Station consists of two 1500-kw., three-phase, Westinghouse alternators, which will be driven by impact water wheels supplied with water under a head of approximately 900 feet. They have also purchased from the Westinghouse Electric & Mfg. Company the excitors, switchboard and raising transformers for this station. The transmission will be at 34,000 volts. The Battle Creek Station is likewise equipped with Westinghouse apparatus.

## Notes from Mexico.

### The Great Fall in Silver.

DURANGO, November 26, 1902.—The most sensational event in the past two or three weeks has been the sudden and unprecedented drop in the value of the Mexican dollar. Exchange has risen within a few days from a premium of \$1.54 to \$1.80—an event bewildering and embarrassing to students of finance and business men alike. Where will it end? is the question upon everybody's lips, with no answer to the query. While the Government postpones action in order to study the question as to the depreciation of the nation's currency in all its ramifications, the great round silver disk, so beloved of the Asiatic trader, and so dear to the hearts of the Mexican people, keeps cheapening in the eyes of the whole trading world for no apparent logical reason. People so fortunately situated as to be living in this republic upon an income earned in or received from a country where gold is the standard of the currency, and the heads of industries whose products are sold in gold standard countries for gold prices, such as that of agriculture, for instance, are reaping their harvest with smiling faces, but the railway companies, the importers, and the Government itself, which has to pay interest upon its foreign debt in gold, feel the pinch and look in vain for some expedient which will relieve them from their daily increasing burden.

Discussing the question the English press of the City of Mexico seem to find consolation in the belief that if silver is cheapening, gold also is becoming of less value relatively than it was some years ago, on account of the increase in the supply of that metal. Says one of these journals: "The man who is to receive a gold payment to-day for a debt contracted, say in 1896, has to take a money distinctly less valuable than when the debtor signed the promise to pay." And again: "Commodities increase in price because gold is over plentiful." The same journal explains the present plight of silver thus: "The value is decreasing because the great governments have turned against the white metal; this is the hard fact, reason as we will."

### The Customs Congress.

Whether or not practical results will follow the action of the late Pan-American Congress, Mexico is solicitous in complying with the resolutions and recommendations adopted by that body during its sessions in her capital. One of these resolutions provided for the assembling of a Custom House Congress in the city of New York, for the purpose of simplifying existing formalities affecting international maritime commerce, and the adoption of a common nomenclature for goods. The Mexican Government has just named two distinguished citizens—Señores Javier Arranzola and Pedro del Paso—as delegates to the Custom House Congress.

### Industrial Notes.

A factory for the manufacture of railway rolling stock is among the new industries projected in Mexico.

The rolling mill equipment of the Monterey Iron & Steel Company's plant was purchased from and installed by the United Engineering & Foundry Company of Pittsburgh. Isaac W. Frank, the president of the latter company, was recently in Mexico making contracts for plantation machinery.

The blast furnace of the Monterey plant will be blown in shortly. Everything is ready with the exception of a stock of iron ore, which the company are awaiting from the mines. Fifteen thousand tons of coke have been received at the works. The foundry and ma-

chine shops are working. The rolling mill and steel making departments will, it is expected, be ready to start up early in the new year. J. J. D.

## Advancement in the Foundry Industry.

F. A. Williams, secretary and treasurer of the Youngstown Foundry & Machine Company, Youngstown, Ohio, manufacturers of rolls and rolling mill machinery, has contributed an interesting article on "Advancement in Foundry Industry" for a special industrial issue of the *Youngstown Telegram*. The article in part is as follows:

The old method of carrying coke, metal, &c., to the charging floor of the cupola by means of tramways or inclines has been superseded by the electric elevator, or elevators of modern design of other motive power. The old jib hand power cranes which took so much manual labor to operate and even the steam power jib cranes have been substituted by the electric traveling cranes and air hoists. Chipping castings by hand will soon be a thing of the past, as the pneumatic chippers are being rapidly introduced into the larger shops. The old style ladles are done away with and the geared ladles have taken their place. Positive pressure blowers direct connected are to a great degree taking the place of fans. Molding machines and core making machines are being rapidly introduced, and many other improvements too numerous to mention facilitate the work in the foundry and increase the output. A cast of 100 tons in a blast furnace 10 or 12 years ago was considered a good output, while to-day many of the foundries make single castings weighing 60 tons.

In the building of rolling mill machinery there has been a vast improvement, and there is hardly a shop to-day but that is equipped with the most modern and improved tools to enable them to do the most exacting work in the least possible time, and improvements in machinery are being made so rapidly that it seems to-day you buy the latest machine built and in a year or so it is out of date.

**An English Building Achievement.**—Englishmen are growing restive under the constant disparagement of English methods of work by their own newspapers as well as by visitors from other countries. Hence when a piece of good work is done they hasten to let the world know about it. For instance, the *Manchester News* for November 8 contains a communication from John Kendall, chairman of George Peake & Co., Limited, giving the details attending the reconstruction of their burned warehouse, seven stories in height, which was accomplished in eight weeks, including the clearing out of the ruins and the taking down of some of the walls. The framework consisted of cast iron columns and steel beams, which, including the iron principals of the roof, were placed in the time mentioned. The building covers 1000 square yards of land, equivalent to about 200 x 400 feet. Skipworth & Jones of Manchester erected the steel and iron work.

A spirit of national pride appears about to be infused in the development of the power of Niagara Falls, so far as Canadians are concerned. Both the Canadian Niagara Power Company and the Ontario Power Company are what are termed American concerns, and now a company that are to be an all Canadian concern have applied for a franchise to develop power in Victoria Free Park at Canadian Niagara. William McKenzie, president of the Toronto Railway Company, and Fred Nichols, president of the Canadian General Electric Company, are said to be at the head of the new syndicate. The new company are said to desire a site for a power station below that of the present two companies.

Frank C. Roberts & Co., furnace designers and builders, Real Estate Trust Building, Philadelphia, have opened an office at 9 Queen square, Middlesbrough, Yorkshire, England.

### What is Steel?

C. H. Ridsdale writes as follows to the *London Ironmonger*:

As regards the selection of a single definition which shall cover all classes of "steel," the difficulty, for trade purposes at any rate, is obviously the very wide range of material now included in the term, for though the differences are mainly those of degree, yet only a tithe of the difference between the extremes is ample to render material which is ideal for one purpose totally unsuited for another. Thus for the purposes of the special trades which are generally associated with Sheffield—viz., cutlery, tools, &c., the definition made is what Professor Arnold has termed the "obsolete and absurd article" in the ninth edition of the "Encyclopædia Britannica"—viz., "the utterly exploded dogma that metal which would harden, temper and let down, was steel, and that metal which would not harden was not steel"—was far more correct (especially if the material possessed those properties to a reasonable extent, as was no doubt implied when the article was written) than it is of by far the larger quantity of the material which is now, as admitted by Professor Arnold, correctly designated as "steel." The chief fault of the "Encyclopædia Britannica" definition is that it does not specifically state within what limits material should behave as described.

It is scarcely correct to say that steel cannot be classified on either chemical, mechanical, or physical data, for though neither perhaps might be sufficient alone, two or more together will cover the ground for any particular class of steel. Indeed, even from a chemical point of view only, metallurgists are pretty well agreed as to the permissible limits; for instance, that the extreme of carbon should be 1.75 per cent., or at most 2 per cent., that manganese should not exceed 1 to 1½ per cent., that no impurity such as silicon, sulphur, or phosphorus should exceed, say, 0.1 to 0.15 per cent., and that for high class qualities it should be decidedly lower. (An exception is steel castings, which may run up to 0.3 per cent. of silicon. Graphite should never be present except in traces. Higher limits than these are generally regarded as special alloys, and on even such a definition the forks in question would have been condemned.

But what is wanted is not a definition applicable to steel generally, but a division of the ranges of steel into several typical classes with reasonably widely defined limits not only of composition, but also possessing certain properties and standing prescribed tests.\* There would be no trouble then from tests or composition "hopelessly overlapping."

If such delimitations were set out and recognized by Act of Parliament they would answer the purposes required, whether legal or practical, where distinct definitions had been given, and it would be the producers' business to make themselves acquainted with these, and to see that their product came within these delimitations and was properly marked, just as is the case at present with butter. It would not be fair to base the classification on the process of manufacture, as the vital point is that the properties be right, and, provided they are, the process is immaterial.

As one single case in point, under the proposed definition by process for shear steel, it is suggested that it "shall have been manufactured from Swedish malleable wrought iron." But surely any equally pure and good material of other origin should not be ruled out.

An exception to the objection to classification by process is, perhaps, the case of articles which have been cast to their final shape and received no forging afterward, and it might be desirable that these should bear some distinctive mark to show they had been cast, though since they would almost certainly not come up to the standard of properties enacted for forged steel,

this would of itself sufficiently debar them from coming under either of the same classes.

Further, it is quite probable that steel having the recognized properties may be obtained by new processes, and then definitions based on process would in time become obsolete, whereas the properties required for, say, a good knife, will not change every few years.

As regards some of the terms used as markings, which have become associated with certain meanings, such as "cast steel" (which should imply, and would be better described as "cast crucible steel," or "crucible steel"), while fully recognizing that it is undesirable to alter these more than is absolutely necessary, yet if a set of clear definitions as proposed were adopted, necessarily more or less altering or restricting the markings, some of these meanings might at the same time with advantage be made more correctly descriptive. It would be another point gained when it became known that no steel could be branded at all if it did not accord strictly with some particular recognized class, and thus the absence of brand would be a mark of inferiority, showing the article to be made from material not recognized as fairly suitable for the purpose. As regards special alloys, it would be better if, instead of exempting them from the rule, they were branded as "alloy steel," "cast alloy steel," or by some index to the alloy, as "chromium alloy steel," &c.

There can be no doubt that any definitions which are to be formally recognized should be the outcome of most careful consideration by a fairly numerous commission of thoroughly qualified men, and should be submitted before final adoption to all the leading metallurgists.

### Pacific Steel & Wire Company.

Articles of incorporation of the Pacific Steel & Wire Company were filed by this company some time ago in Portland, Ore. The officers of the company are: Frank L. Brown, general manager; Frederic W. Hall, vice-president and general counsel; Lewis E. Spear, treasurer. The stockholders of the Pacific Steel & Wire Company comprise some of the leading business men on the Pacific Coast, including among their number D. O. Mills, H. E. Huntington, I. W. Hellman, president of the Nevada National Bank; Antone Borel of Ant. Borel & Co.; Percy T. Morgan, president of the California Wine Association; Frank M. Smith, president of the Pacific Coast Borax Company; Lewis E. Spear, formerly of Lewis E. Spear Company; John Rosenfeld Sons' Company and W. H. Talbot of Pope & Talbot.

Deeds were recorded November 11 in Oakland, Cal., for land for a site for the plant on Oakland estuary in East Oakland. Temporary headquarters have been established in the Mills Building. An official says: "The site selected has a frontage of nearly 1000 feet on the main line of the Southern Pacific Railroad, and over 1500 feet of water frontage on Oakland harbor, thus giving the new company unsurpassed shipping facilities by rail and water. The location selected is also convenient to the street car lines of the Realty Syndicate in Oakland, thus providing accessible homes for the workmen. The Oakland realty was purchased through the well-known firm of A. J. Rich & Co., and consists of about 25 acres of land on Oakland harbor at the Twenty-third avenue station, East Oakland, adjoining the property of the California Cotton Mills."

The executive offices of the company will be in the Mills Building, San Francisco, and the warehouse of the company will be temporarily at 154 First street, the store formerly occupied by the De Kalb Fence Company and Union Fence Company, which business will be hereafter conducted by the Pacific Steel & Wire Company.

The management of the company will be in the hands of thoroughly practical men, who have had many years' experience in the business with the Washburn & Moen Mfg. Company—men who understand the manufacture of the goods and have a thorough knowledge of the requirements of the Pacific Coast trade.

The charter of the company is a very broad one, covering all manufacturing operations. The immediate purpose of the corporation, however, is to manufacture

\* As, for instance, practically all rail steel runs between the extremes 0.30 and 0.55 per cent. carbon, with corresponding mechanical tests, and an ordinary running rail with only 0.10 per cent. carbon, would be as much condemned as a razor made of the 0.30 to 0.55 carbon quality.

only the finer steel and wire specialties, for which there is a great and growing demand in the rapidly developing Pacific Coast States, and the prospect of a large export business with the islands and countries of the Pacific that can be advantageously reached from San Francisco.

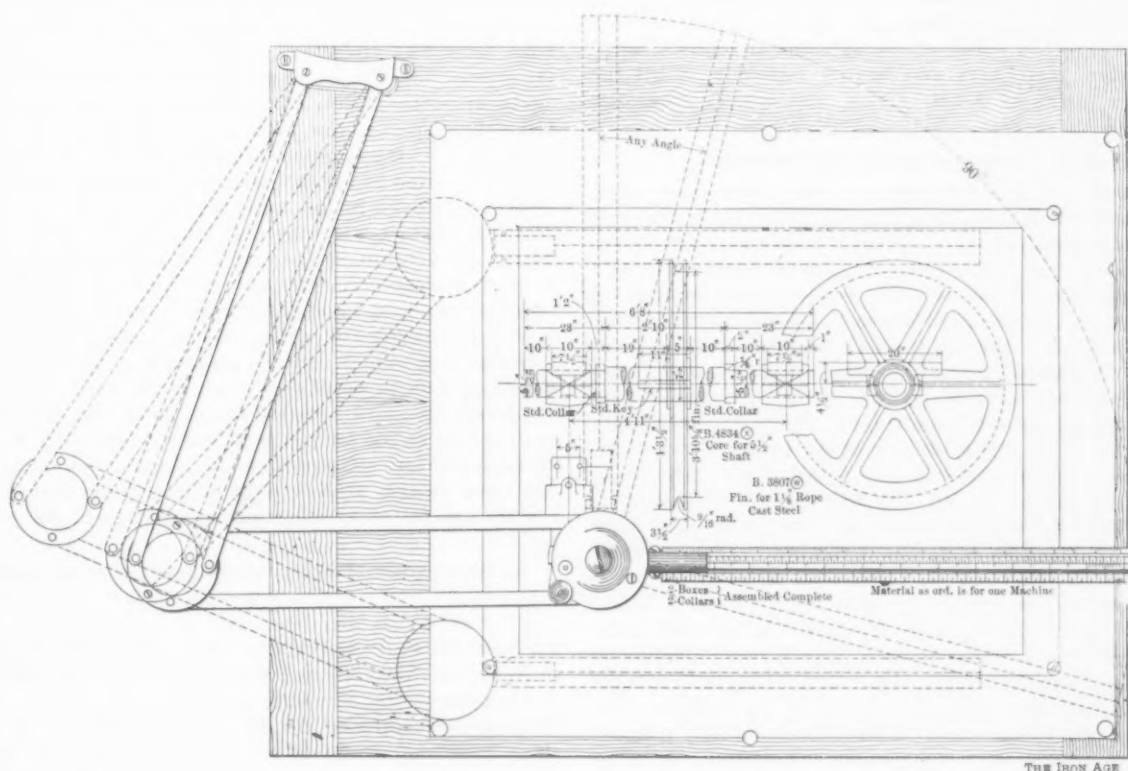
The company have strengthened their position by making immediate connections with the new and modern factories of the National Steel & Wire Company on the Atlantic Coast, at New Haven, Conn., to supply the Atlantic Coast sections and export trade from that coast, and of the De Kalb Fence Company and Union Fence Company, at De Kalb, Ill., to supply the great Middle West and Northwest and Southwest sections.

The plants of the company are all new and embody all the latest mechanical devices for economical manufacture, while the location of the plants is most advantageous for quick and cheap distribution to all parts of the United States and for reaching the export trade;

Columbia School of Mines, and is open to the public without tickets. The lecture will be illustrated by lantern slides from drawings and photographs, many of the slides being colored.

### The Rapid Sketching Device.

The rapid sketching device made by the Universal Drafting Machine Company of Cleveland, Ohio, consists of a scale joined to a protractor which is anchored to the upper left hand corner of the drawing board by means of an arm made up of two pivoted parallelograms, as shown in the engraving. The scale has a free motion of 90 degrees between two stops and it comes against either one or the other, depending upon whether a horizontal or vertical line is desired. These two stops are fastened to a protractor and may be turned to any angle with the horizontal or vertical, thus permitting the scale



THE RAPID SKETCHING DEVICE.

this being the only company in their line of manufacture having plants at tide water on both the Atlantic and Pacific coasts.

The establishment of this plant on the Pacific Coast is another indication of the future growth of the manufactures of California and an earnest effort to develop the export trade of the countries of the Pacific, as well as building up the resources of the Pacific Coast by affording a home market for its products. Large inducements were offered by other cities to induce the location of the plant elsewhere, but the location selected is considered the best on the Pacific Coast in point of rail and water facilities, superior climate and sufficient ground for the building of additional factory facilities, as the growth of this country and trade justifies.

Albert Sutton, the architect, has prepared the plans for the buildings, and work on the first building, an assembling or specialty plant, will commence immediately, and this part of the factory will be in successful operation by February 1.

On Wednesday evening, December 10, at 8 o'clock, a lecture will be given in Room 103, Havemeyer Building, Columbia University, on "The Manufacture of Coke in By-Product Ovens." This lecture will be by Bradley Stoughton of the Department of Metallurgy,

to come against a stop at the desired angle and also at right angles to it. The lower part of the protractor always lies in the same direction, no matter where it is moved about the board, and hence when the protractor is once set at any desired angle the scale will give parallel lines anywhere on the drawing. This is accomplished by the two parallelograms, which act in the same manner as a parallel ruler.

The protractor may be clamped at any angle by means of a thumbscrew. A spring stop is provided for 0, 30, 45, 60 and 90 degree angles, and is operated by merely raising it and allowing it to drop into the hole for the angle desired. A screw is also provided for adjusting the right angle stops. The general use of the device is exactly the same as with a scale without any attachment. Either a triangular or flat scale may be used, and as they chuck into place they may be turned so as to bring any edge into use. The triangular scale has the advantage of giving a larger variety of graduations on one piece, while the flat scale has the advantage of giving a better ruling edge. Either kind of scale, in any graduations desired, can be furnished. The joints of the device are hardened and ground, and with the very slight pressure and speed used will last indefinitely. The pin for the stops is made conical, thereby compensating for wear.

## The Engineering Requirements of South Africa.

LONDON, November 22, 1902.—A report compiled by Ben H. Morgan on the engineering trades of South Africa on behalf of the National Industrial Association has been published by P. S. King & Son of 2 and 4 Great Smith street, Westminster, London, S. W. Mr. Morgan, having accepted the invitation of the South African Committee of the National Industrial Association, sailed for South Africa on June 7 of this year, reaching Cape Town on June 24. He visited Bloemfontein, Johannesburg, Ladysmith, Maritzburg, Durban, East London, Port Elizabeth, and sailed for home on August 14. Of course, numerous small towns were visited on the line of route. He reached Southampton on August 30, having traveled 16,000 miles in 12 weeks. It is obvious that no man could write a really mature judgment upon trade prospects in such circumstances as these. The value of this report does not in the least depend upon Mr. Morgan's own opinion; the report is useful because he has carefully collected the opinions of representative engineers, merchants and buyers generally in all the leading towns of South Africa, and merely transmits them to his readers.

### The Country of Rings and Combines.

Ben H. Morgan emphasizes what many of us have previously, in a vague way, known, that South Africa is *par excellence* the country of rings, combines and monopolies, and that to do business there you must be "in" with the powers that be. From the time that the goods are put on board ship until they are in use it may be said they pass through the hands of the employees of rings. Notwithstanding the difficulties attendant upon a country whose industry has developed along these lines, the report states that South Africa should be one of Great Britain's most important markets, "rich in enormous natural wealth—soil, gold, silver, lead, iron, coal and diamonds, all still practically undeveloped; these should attract a large population and so a large trade. Difficulties of tariffs, irrigation, railway extension, native labor and so forth loom large at the present moment, but will doubtless adjust themselves in due time." In another place we are told, "In the machinery and engineering trades there is a very large amount of business at present being done, and when railway and other transit facilities are released by the military the demand will be very great. Manufacturers may prepare for this market with the greatest confidence. A large proportion of the mining machinery must be renewed after the long disuse, and it is so also with agricultural machinery, while for some time new developments generally will be taking place and new mines and industries opened up."

### The American in South Africa.

Although the vast bulk of the trade of South Africa is still done with Great Britain, this report teems with references to Americans. Here and there one notices a rather sharp criticism of either American methods or American goods, but, in the main, there is a frank recognition that American trade is fast making headway in South Africa, and I do not think I am misinterpreting Mr. Morgan's opinion if I say that he regards the American as being the most strenuous competitor of Great Britain in the future. Particularly is this the case on the Rand. The special mining methods required upon the Rand are those with which Americans have long been familiar in their own country. The result of this is that 50 per cent. of the mine managers on the Rand are of American nationality. It is not unnatural to expect that these Americans, in drawing up plans and specifications for contracts, should do it in such a way as to favor the productions of their own country.

### Weights, Measures and Packing.

Before proceeding to give particulars of engineering requirements in South Africa, just a word or two upon the subject of weights and packing. In quoting in South Africa it would be a great convenience if manufactur-

ers would quote and invoice all goods by the short hundredweight and ton—that is, 100 pounds and 2000 pounds—which are the only weights in use in South Africa by the retailer and user. In regard to packing, it is difficult to realize unless one knows the country the absolutely dominant importance of strong packing. Mr. Morgan states that a Johannesburg merchant showed him a consignment of cast iron goods, 75 per cent. of which were broken, and on this he paid a very heavy freight. In forwarding machinery to South Africa and the Rand care should be taken to cover the bright parts with a paint or grease that will stand a temperature of 120 degrees F. without melting. Much machinery has been damaged in the past by grease having melted off and leaving bright parts exposed to the weather, and consequently rusting.

### Freight and Finance.

To understand the position it may be well to divide machinery used in South Africa into light and heavy. In regard to light machinery, such as that used in agriculture, gas and oil engines, wind mills, &c., the business is done by a very circuitous method. First, it is sent by the commission or shipping house to the wholesale merchant in South Africa, who in his turn sends to the retail storekeeper. Thus there are at least two or three profits on the transaction before it reaches the consumer. This is due to the fact that the wholesale merchant, usually stationed in the coast towns, controls the trade of South Africa with the farmer and the small user, largely on account of the fact that he finances the up-country storekeeper. His hold on the trade is still further strengthened because he finds a market on a 5 per cent. commission for skins, wool, feathers and other farming productions, which the storekeeper finds it to his advantage to purchase from the farmer. Thus the wholesale dealer is both buyer and seller for the retail dealer, who in his turn is both buyer and seller for his retail customer. The system is complicated, but will doubtless remain at it is until such time as transit facilities and better banking methods obtain in the country.

In the matter of heavy machinery, that is another story, and I will refer to it shortly. There is no necessity for me to go into detail on the question of freight, for quotations are easily obtained from the shipping lines in New York, Boston and Philadelphia. It will be enough if I remind our readers that, with one or two exceptions, freights are controlled by the shipping rings. I do not think American exporters will be the first to grumble at the present arrangement, because as things have turned out they are certainly at a great advantage in this respect over both their British and German competitors. But in the report a *pro forma* account showing the freightage of 50 tons of machinery appears, and this I reproduce because it shows clearly exactly what are the financial bearings in the matter of freights which any American must meet in competition with a British exporter:

	£	s.	d.
Freight, 50 tons at 40 shillings.....	100	0	0
Plus 10 per cent. prime (returned in 18 months)....	10	0	0
Insurance on £2,000 at 7 shillings 6 pence per cent....	7	10	0
Entries .....		5	0
Transit duty, 1 per cent. on £2,000.....			Free.
Wharfage, ¼ per cent. ....		5	0
Forwarding and agency. 1 shilling 6 pence per ton....		3	15
Railage, machinery, 60 pence.....	337	0	0
Transvaal duty, 1½ per cent.....	£2,000		
Plus 20 per cent.....	400		
	£2,400	36	0

### The Johannesburg Merchant.

I do not know whether the following criticism upon the Johannesburg machinery merchant applies with equal directness to American manufacturers, because it is known that while the British manufacturer is largely in the hands of the merchant, the American manufacturer transacts his business through the commission house, thereby in all probability getting his goods delivered to the user at proportionately much less cost. But I quote the following opinion of the Johannesburg mer-

chant because it may prove as much a warning to the American as to the Britisher:

British firms are cautioned that they should be most careful in their dealings with the Johannesburg merchant. I do not infer for a moment that he is not a man of first-class business ability and integrity, but for an examination of a large number of tenders for machinery sent in by Johannesburg merchants I am convinced that his disposition is to endeavor to make too large a profit on English machinery. Here is an instance. A few months ago tenders were invited for a high speed, triple expansion, self lubricating engine, directly connected on combination bed plate with a dynamo. A well-known Johannesburg firm of merchants sent in a price of £4080 for an English set delivered on the Rand; the buyer stipulated the make of engine he required and at the same time that he invited prices from the Johannesburg firms he got a price direct from the English makers, and their price, for the same set as that quoted for by the Johannesburg firm referred to, was £3290 delivered on the Rand. This showed a most exorbitant profit, and a continuation of such practice as this would materially affect the British manufacturers, who should come to some understanding with their agents, if possible, in the matter of prices to be charged for their goods.

#### Docks and Harbors.

American makers of machinery used in docks and harbors will be interested to know that the Cape Government has recently voted £3,000,000 for harbor improvements at Cape Town, Mossel Bay, Port Elizabeth and East London. Sixty miles north of Cape Town is a natural harbor known as Saldanha Bay, with a depth of water varying from 5 to 18 fathoms, and large enough to accommodate the whole British fleet. Surveys of this harbor are now being made, as also surveys for the construction of a railway to connect the bay with Porterville Road Station, 80 miles distant on the main line of the Cape Government railways between Cape Town and Johannesburg. There will thus be in all probability before long a great demand for engineering tools of all descriptions for harbor works, water works and railway lines. Americans who can supply hydraulic cranes, slip ways, weigh bridges, electric lighting and power plant dredgers, cranes and winches, should waste no time in finding out the actual requirements of the new harbor works around the coast of South Africa. And I may add that just as Cape Colony has voted £3,000,000 for harbor works in that colony, the Government of Natal is voting a large sum of money for the improvement of Durban.

#### Railroad Requirements.

American competition is making itself felt in the railway politics of South Africa. Thus, in the report, I read:

"There is a danger that with the development of railways in South Africa we shall see an increased import of American rolling stock, plant and material, and this for the following reason: The railway conditions which obtain in South Africa very closely resemble those in the United States and Canada. The area of the country is great, as are the distances between centers, and the partially developed condition of portions of the country presents problems which are thoroughly appreciated by American engineers, who have to provide for similar conditions in their own country. I am convinced that with a thorough understanding of the railway position the British engineer could hold his own without much difficulty, but I am informed by heads of various South African railway departments that at present he does not thoroughly understand them. He does not seem to be able to get away from his long experience in dealing with dense populations, heavy traffic and relatively short distances between all centers as is the case with Great Britain.

In the matter of rolling stock America undersells Great Britain in locomotives, carriages and wagons, but the railway engineers seem to be generally of opinion that the British production, though perhaps not sympathetically meeting the conditions, is of superior make, giving less trouble and costing less for repairs, renewals, oil and fuel. In consequence of this, in selecting tenders, the British article is given an advantage of 10 per cent. In the matter of delivery, Great Britain has lost a great deal of business.

Mr. Morgan is a strong advocate of standardization, although as a practical engineer he knows the dangers involved. He would standardize wheels and axles, axle boxes, springs, sections of under frames and draw gear, while in the bodies of carriage and wagons, he thinks, standard sizes might be adopted for all fittings used. In locomotives he advocates standard sizes for size of journal and axle, eccentric sheaves straps, valve motions, axle boxes and boiler mountings. On the Cape Govern-

ment railways the nearest approach to standardization has been obtained. It was found a few years ago that the eighth coupled, seventh class, although good engines for their size, were not as heavy and powerful as they might be. A design was therefore got out by the locomotive engineer in the early part of 1900 for an eighth coupled, with single leading bogey. Two of these engines were ordered from the Schenectady Locomotive Works in May, 1900, and put to work in March, 1901. They have fulfilled expectations, and a further order for 14 similar locomotives is now being executed. Twenty-three similar locomotives, but with a four-wheel leading bogey and shorter fixed wheel base, are being built by Neilson, Reid & Co. of Glasgow. There are other American engines at work, notably ten supplied in 1901 by the Baldwin Locomotive Works. Last November tenders were invited by the Cape Government for the supply of 24 locomotive engines and tenders, with the following result:

	Price.	Specified time for delivery.
British .....	£94,160	52 to 65 weeks.
American .....	77,940	36 to 43 weeks.
German .....	78,428	36 to 41 weeks.

The orders for these 24 locomotives were given to the British firms, but it is clearly stated that these conditions will not obtain in future. In the matter of cattle wagons the Hungarians have secured the trade. It would be superfluous to quote the experience of the Natal, Transvaal and Orange River Colony railways, as it is very much a duplication of what has been stated in regard to the Cape Colony. The American locomotive engineer is forging ahead in South Africa. But I must not enter into further particulars in regard to the railways of South Africa. Those interested will obtain the report and study it for themselves. Just one word of warning. It is stated that British carriage and wagon builders are now able to quote lower prices than formerly. A British firm will now sell a truck for £480 for which two years ago they charged £600 and for £190 what was previously sold for £290. The amalgamation in this country of the rolling stock concerns, of which I have kept readers of *The Iron Age* fully informed, must help enormously in economic production. That there is plenty of room for greatly increased American competition will be evidenced by my stating the proportion of orders placed with Great Britain, America, Germany and Holland. The period over which these orders were placed is not mentioned, but they are figures supplied by the Cape Government for locomotives, carriages, trucks and stores:

	£	s.	d.
To manufacturers or suppliers in Great Britain.....	908,834	0	9
" " " America.....	68,307	14	2
" " " Germany.....	4,653	9	6
" " " Holland.....	693	15	1
Total.....	982,488	19	6

#### Coal Mining Machinery.

In common with the rest of mankind I have, of course, known that there were several rich coal deposits in South Africa. Judging by this report there would seem to be more coal than most of us imagined. We are told that workable seams and deposits are found in Cape Colony, Natal, Transvaal and Rhodesia, and though inferior to English coal it is so plentiful and so easily burned that it serves all industrial purposes. As inland transporting and handling facilities increase, and when more modern coal getting machinery is utilized, Mr. Morgan is of opinion that South Africa will practically cease to import, and may even become a coal exporting country. In the Transvaal in 1898 there were 53 coal mines, which produced 1,907,808 tons. Of this amount 1,239,184 tons were mined in the Boksburg district and 300,900 in the Heidelberg district. Coal exists in great quantities (at least so we are told) in the districts of Pretoria, Middleburg, Heidelberg, Veyheid, Standerton, Ermelo and Wakkerstrom. Some of the beds are of enormous thickness, one having been proved as wide as 211 feet, while at the Great Eastern colliery Johannesburg, there is a seam 75 feet thick.

Electricity as a motive power is very largely used and large orders have recently been placed for this pur-

pose. Many particulars as to the electric plant required are given in the report. Taking the Indwe collieries in Cape Colony as a sample, here is a description of the coal cutting machines in use:

Eight standard Jeffrey electric coal cutting machines and one English longwall cutter are now at work. Very little, however, beyond pushing on development drives is being done at present, owing to lack of sufficient power. The roof is splendid, and perfectly safe in stoop and room work, but becomes very dangerous when a large area of it gets on the timber. It will not bend and settle gradually behind the working faces, like the ordinary shale roof, but stands perfectly safe until the briggling capacity of the rock is exceeded, when it comes down with irresistible force, and without warning usually. The biggest area that can be worked safely is about 120 x 25 yards. This was fatal to the chances of the longwall type of cutter, and after the purchase and trial of one Jeffrey machine it was decided to adopt them exclusively. These machines are of the chain breast type, and undercut 6 feet by 3 feet 8 inches wide, the cut being about 4 inches high. The original feed gear with which the machine was fitted was evidently meant for cutting in soft coal, and cut in at the rate of 19 inches per minute. The cutting at Indwe being very tough, there was, with this quick feed, an alarming wear and tear on the chain, and great difficulty in keeping the machine jacked firmly in position during the cutting, so the succeeding machines were all equipped with a feed gear of 12 inches per minute, which now gives very little difficulty.

The mechanical screens in use are by Kesson, Campbell & Binnie. Fairly full descriptions are given both of mechanical screens, picking tables, mechanical stokers and other facts relating to the coal industry of South Africa.

#### Gold Mining Machinery.

It would require a long article in itself to deal with the gold mining machinery now required in the Transvaal. At the outbreak of the war the total capitalization of the gold mines on the Witwatersrand alone was over £70,000,000 at par and about £145,000,000 at market prices. The value of machinery on the mines of the Transvaal at the end of 1898 was £9,400,059. On the mines there were 1223 steam engines, 1593 boilers, 370 dynamos, 570 electric motors, 702 hauling engines, 822 pumping engines, 295 ore crushers, 1965 rock drills, 7149 stamps and 16,510 trucks. The total horse-power employed was 149,330. As to the future demands of the gold fields, I quote the report:

It is probable that within the next five or six years the Rand alone will require new mining machinery and plant to the value of from £25,000,000 to £30,000,000. Roughly speaking, at the outbreak of the war the rate of gold output on the Rand was £20,000,000 per annum. There were about 6000 stamps running, each having an output of something over £3000 per annum. I was informed by the manager of one of the leading houses in Johannesburg that within the next six or seven years it is contemplated to put in over 11,000 additional stamps, so that in 1910 the gold output should be about £50,000,000 per annum.

I regret that space precludes any detailed reference to the types of machinery required. I can only refer those interested to the report itself.

#### Electrical Machinery.

A factor in the question of gold mining machinery is that of electrical machinery, but the use of electrical machinery, of course, extends much beyond the gold mines. There are, for example, the lighting works and transit. A statement is made of the electrical trams and lighting in use in Cape Town, East London, Durban, Maritzburg, Johannesburg, Kimberley, King Williams-town, and Ladysmith. On this point we are told that in the matter of the East London tramways American firms sent special representatives to educate the Council and people generally in the matter of tramway engineering and to take American plant. Every one who had any influence on the voting of orders was seen by American representatives and conversed with, and this education extended over several months. With such vigor and determination it is not surprising that the Americans obtained the bulk of the contract. The American quotation for the trams in question was £970; the English price £1200. It is no part of my business to comment upon Mr. Morgan's sweeping condemnation of English firms for their apathy, but he is emphatic that the Americans are winning in this department because of greater enterprise.

#### Structural Work.

I must pass rapidly over the detail references to pumps, pipes, flanges, agricultural implements and ma-

chinery, heavy traction engines and heavy motor vehicles, and conclude this hurried survey with some reference to structural work in iron and steel. On this point I quote:

There is a demand in South Africa at the present time for high buildings of American type, and there are indications that in the next few years an enormous business will be done in steel frames for these. Whether the enterprising American himself created this demand, or whether he anticipated it, I do not know, but his representatives are at the present time on the ground booking large orders in the important towns. I know of one man alone who booked orders for seven large buildings in Cape Town, and while I was in Johannesburg booked orders there for six more buildings, one of which was to be of eleven stories. And while all this business was being done, I believe I am correct in saying that there was not a representative of a single English firm in South Africa who was prepared to submit a drawing and give a price and time of delivery for the steel work of a high building on the spot. This state of things was most discreditable to the enterprise of British manufacturers, especially in view of the fact that some of their works have been running practically short of work for some time past.

Altogether it would look as if the American are going to capture South African work in structural steel. A Johannesburg merchant remarked: "An American representative is now established here. This American can show you specimen designs of buildings of all descriptions and quote in detail, tell you everything about the matter and give delivery with astonishing rapidity. I believe there are plenty of English firms capable of doing it, but there is no representative here and we cannot waste time in correspondence."

#### The Report as a Whole

I have given our readers some idea of the facts and opinions expressed in this report. I think, however, it would have been better to have waited another month or two and given it a little better "dressing." The book abounds in grammatical blunders and here and there there are still more serious mistakes. The Brown & Sharpe Mfg. Company, in the section devoted to machine tools and appliances, are described as Brown, Sharp & Co., and there are other mistakes of a similar sort. If there is one thing that writers of trade reports should be particularly careful of it is to give the exact name of all firms referred to. Nor do I think that Mr. Morgan shows much sense of proportion in his comments upon the business life of South Africa. Every time he sees an American, German, Belgian or Swiss he sees in his mind's eye the death blow to Great Britain's prestige. The fact is, there is plenty of room in South Africa for manufacturers of all nationalities and it is only by the clashing of the best of every country that real progress can be effected.

S. G. B.

#### New Canal Project in New York.

One of the very important matters that will come before the next session of the New York Legislature will be in regard to improving the State waterways, and it is already intimated from Albany that Governor Odell will favor a 1000-ton barge canal that will cost from \$55,000,000 to \$60,000,000, a saving of \$20,000,000 as compared with the previous \$80,000,000 estimate for a similar canal. The saving, it is said, will be made through adopting what is known as the lake route, under which plan the route would be as follows:

From Waterford to Cohoes by the old canal, through Mohawk River to Rexford Flats and Little Falls, recrossing the New York Central Railroad four miles east of Genesee street, Utica; running north of Utica and recrossing the New York Central Railroad about two miles west of Oriskany; passing south of Rome to Fort Bull and down Wood Creek to Oneida Lake; going 19½ miles in deep water through Oneida Lake; following the Oneida River with the exception of two large bends west of Brownton to Three River Point; down the Oswego River to Lake Ontario; by way of the lake in deep water to Olcott, a distance of 112 miles; by a new canal 18 miles to a junction with the old canal two miles west of Lockport, and via the old canal to Tonawanda and Buffalo.

It is estimated that the distance by this route is 338 miles, as compared with 342 miles by what is known as the inland route. If adopted, this plan and route would cut Clyde, Lyons, Newark, Palmyra, Brockport, Albion, Medina, Middleport and such places out of canal traffic. It is suggested, however, that the old canal be main-

tained for traffic to these places. Advantages of the proposed lake route are that the annual cost of maintenance for the nearly 200 miles of lake navigation would be nothing, while there is said to be a gain of from 35 to 40 hours on the route as compared with the inland route. It is conceded that stronger barges would be necessary on the lake route than on the inland route. Considering the many interests that are vitally concerned in the big project, there is little doubt but that the subject will be well discussed before a final decision is made.

## The Lovering Drawback Bill.

### A New Draft Introduced in the House.

WASHINGTON, D. C., Dec. 2, 1902.—Representative Lovering of Massachusetts, the author of the pending bill designed to liberalize the drawback laws, introduced in the House yesterday, the opening day of the session, a new draft of his measure, which contains a number of very important modifications. The bill was referred to the Committee on Ways and Means and assigned to the special subcommittee which has charge of this bill and which is composed of Messrs. Payne, chairman; Dalzell, Grosvenor and Hopkins. General Lovering has had an extended conference with Mr. Payne and has sought to impress upon him the fact that many manufacturers in all important lines of trade are now endeavoring to seek a foreign outlet for their surplus products, which they can only hope to secure through a more liberal interpretation of the drawback principle, especially if the leaders in Congress finally determine not to revise the tariff in the immediate future. In the modified draft of the bill as introduced yesterday Section 1 has been amended by striking out the following proviso:

*Provided, That where both imported and domestic materials are blended in the manufacture or production of articles or part of articles for the purpose of manufacturing or producing articles of a special grade or quality, the relative quantities and proportions of the materials used must be shown by the manufacturer or producer for use as a basis for determining the quantity of imported material on which drawback may be allowed.*

The above provision was eliminated because, in the opinion of experts, it deals with an administrative matter which should more properly be made the subject of a departmental regulation. Its incorporation in the bill tended to complicate the measure and it was therefore stricken out.

Section 2 of the original bill, which covered imported materials used in the construction of vessels in the United States for foreign ownership, or employed in the manufacture of articles subsequently consumed on board foreign vessels and not landed abroad, has been divided into two sections, which appear as Sections 2 and 3 of the new bill. Section 2 provides for drawback on materials used in the construction of vessels built for foreign ownership and specifies that the drawback shall be determined and paid in the manner now pursued in the case of exports of merchandise intended to be landed abroad under Section 30 of the Dingley act, which is the existing drawback statute. The enactment of Section 2 of the revised bill would amount to its substitution for Section 12 of the Dingley act. Section 3, which relates to imported materials used in the manufacture of ships' stores, is designed to meet the issue raised by the Treasury Department in the Swan & Finch case, now in the United States Supreme Court, in which drawback was refused on imported materials used in the manufacture of lubricating oils consumed on foreign vessels on the ground that as the oils were not landed abroad they could not be regarded as having been exported and, therefore, were not entitled to drawback. The new section is as follows:

Section 3. That where imported materials on which duties have been paid are used in the manufacture or production of articles manufactured or produced in the United States, there shall be allowed on such articles when consumed on vessels clearing for foreign countries a drawback equal in amount to the duties paid on the materials as used: *Provided, That such drawback shall be determined and paid in manner provided for*

determination and payment of drawback on exportation of articles of domestic manufacture and production made wholly or in part from imported duty paid materials under Section 30 of an act entitled "An act to provide revenue for the Government and to encourage the industries of the United States," approved July 24, 1897.

As a result of critical examination by the Committee of Manufacturers, which now has charge of this bill, Section 6 of the original measure relating to alcoholic preparations has been eliminated. The ground on which this section was stricken out was that it was merely declaratory, for the reason that the Secretary of the Treasury is now clothed with all necessary authority in the premises.

The most important changes in the new bill are found in two new sections which have been added and which appear as Sections 7 and 8. Section 7 is intended to amend Section 29 of the Dingley act relating to the refining of lead ores in bonded warehouse, and was incorporated in the first draft of the Lovering bill when submitted to the Ways and Means Committee last winter, but was eliminated from the bill as finally introduced by General Lovering and is now restored. It is as follows:

Section 7. That the drawback allowed under existing law on refined metal withdrawn from bonded warehouses, established under authority of Section 29 of an act entitled "An act to provide revenue for the Government and to encourage the industries of the United States," approved July 24, 1897, and used in the manufacture of articles exported from the United States, shall be equal to the amount of duties which would have been remitted had such refined metal been exported.

Section 8 is entirely new, and is designed to permit the allowance of drawback of duty paid on imported coverings or wrappings or any kind when used on exported domestic articles. It is as follows:

Section 8. That where imported materials on which duties have been paid are used as covering or wrappings of articles manufactured or produced in the United States, there shall be allowed on the exportation of such articles a drawback equal in amount to the duties paid on the materials used as such coverings or wrappings: *Provided, That such drawback shall be determined and paid in manner provided for determination and payment of drawback on exportation of articles of domestic manufacture and production made wholly or in part from imported duty paid materials under Section 30 of an act entitled "An act to provide revenue for the Government and to encourage the industries of the United States," approved July 24, 1897.*

The Treasury Department has received many applications for drawback of duty paid on imported coverings, but under a number of decisions, and especially that of the Supreme Court in the case of the Tidewater Oil Company, it has been held that the addition of a covering or case of any kind to an exported article did not constitute a "manufacture" within the meaning of Section 30 of the Dingley act, and drawback has therefore been denied. The Department has refused to entertain applications for rebate of duty on imported box shooks for the casing of oil cans and other merchandise, and on barrel shooks, hoops and heads intended to be made up into containers for the exportation of various liquids. The new section above quoted would cover all such cases.

A special effort is now being made by the Manufacturers' Committee to make it entirely clear to the leaders in Congress that the pending drawback bill is not a tariff measure and therefore that its consideration and enactment are not inconsistent with a Congressional programme which excludes all tariff legislation. It is pointed out that no rights are conferred by the bill which are not granted by Section 30 of the Dingley act. The bill merely removes the grounds for certain technical objections to a rational and consistent interpretation of the drawback statute and brings it into line with modern commercial methods.

W. L. C.

Early Saturday morning, November 29, the Lehigh Valley ore dock running into the Blackwell Canal at the Tift farm, Buffalo, collapsed under the weight of thousands of tons of ore. A locomotive was caught in the slide and badly wrecked. Fortunately nobody was injured. The cave in was about 350 feet long. Quick-sand is the supposed cause of the wreck.

## A Comparison of the Origin and Development of the Iron Ores of the Mesaba and Gogebic Iron Ranges.\*

BY KENNETH LEITH.

Most of you are familiar with certain similarities in the Mesaba iron range of Minnesota and the Gogebic iron range of Michigan. The iron formations of the two districts are similar; almost every phase of the rock in one formation—not every phase—may be duplicated in the other, although in varying abundance. The rock underlying the iron formation in each district is a quartzite and quartz-slate formation. Between the iron formation and the underlying quartzitic formation in both districts is evidence of a slight erosion interval. Above the iron formation in each district is a great thickness of black slate almost identical in character. In both districts the iron formation grades into the black slate by interstratification, and layers of slate are found well down in the iron formation. In both districts the iron formation is magnetic and nonproductive where in contact with abundant Keweenaw igneous rocks. The similarity in lithology, in succession of formations and in relation to other series has led geologists to correlate the iron bearing series of the two districts and to call them both parts of the Upper Huronian series. In the Mesaba district, on the north side of the Lake Superior basin, the iron bearing series dip at low angles, 8 or 10 degrees, to the south. In the Gogebic district, on the south side of the Lake Superior basin, the iron bearing series dip at high angles, 65 degrees and thereabouts, to the north, suggesting that the iron bearing series of the Mesaba and Gogebic districts form respectively the north and south limbs of a gentle syncline passing under Lake Superior.

In view of these facts the question naturally arises: Have the origin and development of the ores in the two districts been the same? It is my purpose briefly to outline and compare certain conclusions on this subject reached by members of the United States Geological Survey in the course of their work on the two ranges.

The original rock of the iron formation in the Gogebic district—that is, the rock which by its alteration has yielded the iron ores and associated cherts and jaspers—was long ago determined by Irving and Van Hise† to be a cherty iron carbonate. The alteration of this rock by surface oxidation and percolating waters, bearing oxygen, carbon dioxide and other substances, has resulted in the decomposition of the iron carbonate into its constituents, ferrous iron and carbon dioxide, the oxidation of the ferrous iron to more or less hydrated hematite, and the segregation of the ferric iron and chert. Where the segregation of the iron oxide and chert has occurred on a small scale ferruginous cherts and jaspers have resulted. Where the conditions were favorable to the segregation of iron oxide on a large scale than iron ore deposits have resulted.

In the Mesaba district the original rock of the iron formation—that is, the rock which by its alteration has yielded the iron ores and their associated ferruginous cherts making up the iron formation—was shown in 1894 by Spurr to be one composed of minute green ferrous silicate granules, similar in appearance to glauconite or green sand granules, lying in a matrix consisting essentially of chert. The rock is frequently called "greenstone" by explorers and confused with the true igneous greenstones of the underlying formation. Spurr called the green granules "glauconite." Recent work by the chemists of the United States Geological Survey has shown the granules to be absolutely lacking in potash and also to have other chemical characteristics not possessed by glauconite, and hence the name "glauconite" has not been retained. Since the material seems

to correspond to no known mineral species the term "greenalite" has been coined. The greenalite granules were determined by the chemists of the United States Geological Survey to be essentially hydrous ferrous silicate, with small amounts of magnesia and ferric oxide. While the chemical results are not sufficiently accordant to be conclusive, they point strongly to a combination of the principal constituents ferrous iron and silica in the ratio of one molecule of each, the ferrous iron being more or less slightly replaced by magnesia. The alteration of a rock made up largely of granules of this composition, through surface oxidation and percolating waters bearing oxygen, has consisted in the breaking up of the ferrous silicate, the oxidation of the ferrous iron to hydrated hematite and the segregation of the iron oxide and silica. As in the Gogebic district, where segregation has occurred on a large scale cherts and jaspers have resulted, and where segregation of the iron oxide has taken place on a large scale the iron ore deposits have been formed.

But this is not all the story for either district. Recent microscopical re-examination of the iron bearing rocks in the Gogebic district has confirmed Irving and Van Hise's conclusion that the original rock of the formation was mainly an iron carbonate, but it has also disclosed the remains of granules similar in form to those making up the bulk of the original rock of the iron bearing formation of the Mesaba district. These are to be discriminated from the chert concretions which have developed secondarily from iron carbonate. In the Mesaba district, moreover, while the rocks containing the green granules form the bulk of the original rock of the iron formation and the rock from which the ores and associated rocks have been mainly derived, iron carbonate in small quantity is found now associated with the unaltered green granules and there is evidence that iron carbonate formerly existed in portions of the iron formation at present much altered. Certain carbonates in the Mesaba district are undoubtedly secondary alteration products, but these can in many cases be discriminated from other carbonates, certainly original interlayered with the unaltered greenalite rocks. The alteration of these original iron carbonates, occurring in small quantity, has in rare instances been accompanied by the development of ferruginous chert concretions similar to those in the Gogebic district and quite different from the greenalite granules and their derivatives.

Thus a complete statement of the derivation of the ores in the Mesaba and Gogebic districts would be somewhat as follows: In the Mesaba district the ores and associated cherts have been derived mainly from the alteration of hydrous ferrous silicate granules and to a very subordinate extent from the alteration of iron carbonate, while in the Gogebic district the ores have been derived mainly from the alteration of iron carbonate and subordinately from the alteration of granules which from their shape and manner of alteration were probably originally ferrous silicate granules similar to those of the Mesaba district. It is interesting to note in this connection that the eastward extension of the Mesaba range, at Gunflint Lake and eastward to Port Arthur, shows an increasing amount of original iron carbonate in proportion to the green granules, suggesting a gradation in this direction from typical Mesaba to typical Gogebic iron bearing rocks.

Time will not permit of our going still further back and attempting to trace out the origin of the green granules and the iron carbonates, nor is the subject one of direct interest to the members of the Institute, who are for the most part concerned with the principles governing the localization of the ores rather than their ultimate source. In passing it may be said, however, that the origin of the iron carbonates has been repeatedly discussed by Van Hise\* in United States Geological Survey monographs and reports on the Lake Superior iron districts, and that the greenalite granules of the Mesaba district, consisting of iron silicate analogous in its composition to iron carbonate, and associated with iron carbonate, are believed to have developed in an analogous

\* Abstract of paper presented to the Lake Superior Mining Institute in August, 1902, reprinted from the Proceedings of the Institute. For a somewhat full discussion of the features here sketched see Monograph on the Mesaba Iron-Bearing District, No. XLIII, United States Geological Survey.

† *American Journal of Science*, Vol. 37, 1889, pp. 32-48; Monograph XIX, United States Geological Survey, 1892.

\* See Monographs XIX and XXVIII, Folio 62 and Pt. III of Twenty-first Annual Report of United States Geological Survey.

manner. Yet it is also possible that the greenalite granules, although themselves demonstrably not glauconite, may have developed in somewhat the same way as glauconite.

It has long been evident to all who have studied the iron ore deposits of the Lake Superior region that the alteration of the original rocks of the iron bearing formations has taken place mainly through the agency of percolating underground waters, bearing oxygen, carbon dioxide and other substances. It would be natural to expect, therefore, that where the circulation of these waters has been most vigorous, there extensive alteration of the iron formation and segregation of the iron ores would be likely to be found. In the Gogebic district this is clearly the case. It is scarcely necessary to describe to you the concentration of the underground flow of this district in sharp pitching troughs formed by the intersection of greenstone dikes with the foot wall quartzite and the further control of the flow by fault planes cutting these dikes. The direct localization of the ores by waters concentrated in this way is here so evident that it has proven of great assistance in exploration and development work.

In the Mesaba district the evidence that the ores have developed from the alteration of the original iron formation through the agency of percolating waters is just as decisive, but here the structure of the iron formation is such that the nature of the circulation of the water and consequent localization of the ores is not so apparent. The iron formation and its associated rocks lie in beds on the south slope of the Giant's range and dip off gently to the south at angles averaging 8 or 10 degrees. In addition to the general southward tilting of the beds, they are gently flexed into folds with axes transverse to the trend of the range. Waters falling on the south slope of the Giant's range and flowing to the south enter the eroded edges of the iron formation and continue their way down along its layers, some of which are pervious and some of which are slaty and comparatively impervious to water. The flow thus tends to become concentrated along the axes of the gently southward pitching synclines in the formation. Such synclines are not necessarily surface troughs. They are evidenced by the attitude of the layers of the iron formation, and may not be apparent in the unequally eroded rock surface or at the surface of the irregular covering of glacial drift. The concentration of the flow along the synclines in the layers of the iron formation seems so simple and evident that there is a temptation to generalize and say that the underground circulation has probably concentrated the ores along these broad synclines. When the district was first examined by the United States Geological Survey this simple explanation was applied. But detailed study shows that other factors modify the circulation of water and the localization of the ore and that these secondary factors may be locally dominant.

The most important of these modifying factors is the fracturing of the iron formation, which has furnished numerous trunk channels for the circulation of underground waters. The water has been confined to narrow, irregular and most devious trunk channels formed by the fracturing of the iron formation, and, while it has probably followed the fracture openings along synclines to a greater extent than along anticlines, it has not filled the entire syncline formed by the folding of the iron formation. The result is that the ores have developed along limited and irregular areas within the synclines. They may occupy a considerable part of the syncline, in which case the synclinal structure of the iron formation may be observed in the layers of wall rock adjacent to the ores. In other cases they occupy so small a proportion of the syncline that the layers of the iron formation in the adjacent wall rock give no indication of synclinal structure. Not infrequently several more or less independent deposits may have developed in the same general syncline, as for instance in the area adjacent to the town of Virginia. To put it briefly, the ores show such position, irregularity, extent and relations to wall rocks as to make applicable the expression sometimes heard in the district that the ores have developed through rotting of the iron formation

along fractures, usually, but not always, in broad synclinal areas.

Other factors modifying the general underground flow of water in the Mesaba iron formation are the numerous impervious slaty layers within the iron formation and the Virginia slate capping the iron formation of the south, all of which have considerable effect in directing water circulation. So far as the water is free to flow southward through the iron formation the impervious layers serve only to limit the flow below. But the continuous south dip of the impervious strata carries the waters down to a point when the ground is saturated and the waters are ponded between impervious layers above and below. That ponding actually occurs is shown by the fact that drill holes penetrating the slates and entering the iron formation frequently meet water under pressure, indicating artesian conditions. When ponded the water seeks the lowest point of escape, which is likely to be found near the north margin of the slate layers. The movement of the water toward the lowest point of escape causes a considerable lateral movement in the circulation, and this lateral movement has probably been in the past responsible for the concentration of certain deposits on the range which have their longer directions parallel to the strike of the layers of the iron formation.

The ponding of the water and the consequent overflow has still another effect. Where ponded the flow is governed by the point of lowest escape rather than by the shape of the impervious basement. When water is drawn off at the edge of a basin the flow is greatest near the point of escape and diminishes in all directions away from that point. It makes no difference whether the bottom of the basin is flat or fluted, this statement still holds. Hence, in the Mesaba iron formation, where the water is ponded the flow is concentrated near the point of lowest escape regardless of whether this be over a syncline or anticline so far as both are below water level. The lowest point of escape is likely to be over synclines, but the surface erosion, both by glacial and meteoric agencies, has been such that this is not always the case. It is for this reason that certain iron ore deposits near the edge of the Virginia slate and near the edge of interstratified slate layers may have developed either along arches or synclines of the iron formation.

The above facts have an interesting bearing on the question of finding ore under the solid black Virginia slate. The question is frequently asked, Is there any reason why ore shall not be found under the black slate? The absence of ore under the slate has not been demonstrated by actual drilling; only a comparatively few holes have penetrated any considerable thickness of the Virginia slate and entered the iron formation below. Yet such holes as have been put down have not revealed ore, and in several cases have shown the iron formation beneath the slate to be of a green unaltered variety, indicating that the alteration necessary for the development of ore deposits has not gone far. If the development of the ore is dependent upon a vigorous circulation, and this vigorous circulation is lacking under the Virginia slate because of the ponding, we have here an adequate cause for the nonexistence of ore deposits under the black slate. Yet further work may show that other factors have entered, and considering the extent and value of the new iron bearing territory which would be thrown upon were ore found under the Virginia slate, more actual drilling seems advisable to settle the question.

In closing, I would emphasize the fact that the geology and development of the ores in the Mesaba and Gogebic districts show many features in common, and that certain of the underlying principles apply equally well in both districts, but that other principles, and these unfortunately the ones of most value in guiding exploration, cannot be carried from one district to the other. We have here an excellent illustration of the general truth that the principles found to be applicable to the geology and development of the ore in one district are helpful in studying another and similar district, but that their specific application to the new area must be made with the greatest care.

## New Japanese Tariff.

Under date of October 16, 1902, Minister Buck of Tokyo sends the Department of State a copy of a revised tariff schedule, to take effect April 1, 1903, from which the following items are taken:

Description.	Old duty.		New duty.	
	Yen.		Yen.	
Shot, per 100 kin*.....			2.187	\$1.08
Glass:				
Window (uncolored and unstained), per 100 square feet.....	.400	\$0.20	.628	.31
Plate, silvered or unsilvered, per 100 square feet.....			6.896	3.43
Beads, known as Venetian beads, per 100 kin.....			1.738	.87
Broken or powdered, per 100 kin.....			.065	.03
Antimony, ingot and slab, per 100 kin.....			.391	.19
Bar and rod, brass, per 100 kin..	3.070	1.53	5.195	2.59
Plate and sheet, per 100 kin.....	3.086	1.54	4.748	2.36
Pipes and tubes, per 100 kin.....			4.924	2.45
Old (only fit for remanufacturing), per 100 kin.....	.915	.40	.986	.49
Copper:				
Bar and rod, per 100 kin.....	3.464	1.73	5.206	2.59
Plate and sheet, per 100 kin..	3.488	1.74	5.155	2.57
Nails, per 100 kin.....	3.956	1.97	6.010	2.99
Pipes and tubes, per 100 kin..			5.948	2.96
Wire, per 100 kin.....	7.496	3.73	6.306	3.14
Old (only fit for remanufacturing), per 100 kin.....	.799	.40	1.342	.67
German silver (plate, sheet and wire), per 100 kin.....	6.020	3.00	7.583	3.78
Iron and mild steel:				
Pig and ingot, per 100 kin....	.083	.04	.113	.06
Bar and rod (of diameter exceeding 1/4 inch), per 100 kin..	.356	.18	.464	.23
Hoop and band, per 100 kin....	.427	.21	.502	.25
T angle and other wrought iron and mild steel, per 100 kin..	.313	.16	.539	.27
Rails, per 100 kin.....	.297	.15	.384	.19
Dog spikes thereof, per 100 kin.....			.588	.29
Fish plates thereof, per 100 kin.....			.471	.23
Sheet and plate, corrugated, per 100 kin.....			.867	.43
Steel and plate (corrugated excepted, per 100 kin.....)	.853	.42	.499	.25
Galvanized sheet and plate, plain or corrug., per 100 kin.			.953	.47
Plate, diagonal or checked, per 100 kin.....	.345	.17	.486	.24
Nails (dog spikes, bolts and nuts, &c., not galvanized, per 100 kin.....)	.575	.29	.583	.29
Tinned plates, plain, per 100 kin.....	.691	.34	.961	.48
Wire and small rod not exceeding 1/4 inch in diameter (tinned), per 100 kin.....			.605	.30
Telegraph wire, galvanized, per 100 kin.....	.591	.29	.676	.34
Wire rope:				
Galvanized, per 100 kin.....	1.367	.68	1.280	.64
Not galvanized, per 100 kin..			1.874	.93
Old (galvanized or otherwise), per 100 kin.....	.109	.05	.127	.06
Old hoops, per 100 kin.....	.103	.05	.141	.07
Old iron and other iron and mild steel (only fit for remanufacturing), per 100 kin....			.144	.07
Lead:				
Pig, ingot and slab, per 100 kin..	.368	.18	.420	.21
Sheet, per 100 kin.....	.753	.38	.982	.49
Pipes and tubes, per 100 kin....			1.148	.57
Mercury, per 100 kin.....	5.689	2.83	7.617	3.79
Nickel, per 100 kin.....	3.529	1.76	4.831	2.47
Steel (not mild):				
Bar and rod, per 100 kin.....			1.699	.85
Sheet and plate, per 100 kin..			.689	.34
Wire and small rod not exceeding 1/4 inch in diameter, per 100 kin.....	1.819	.91	1.936	.96
Wire for umbrella ribs (trough shaped), per 100 kin.....	2.145	1.07	2.315	1.15
Wire rope, plain or galvanized, per 100 kin.....	1.647	.82	2.654	1.32
Old wire rope (only fit for remanufacturing), per 100 kin..	.117	.06	.256	.13
Tin, pig and slab, per 100 kin..	1.992	.99	3.377	1.68
Yellow metal (Muntz metal):				
Sheet and plate, per 100 kin....	2.871	1.43	4.042	2.01
Rod and bar, per 100 kin.....	2.586	1.29	4.244	2.11
Zinc:				
Block, pig and slab, per 100 kin..	.451	.22	.559	.28
Sheet (No. 2 excluded), per 100 kin.....	1.303	.65	1.407	.70
Old sheet and other zinc (only fit for remanufacturing), per 100 kin.....	.297	.15	.353	.18

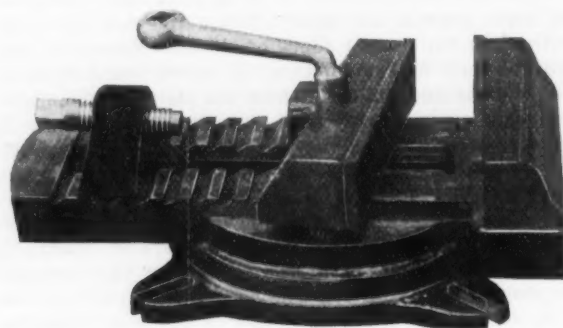
\* 1 kin = 1.33 1-3 pounds.

## Powder:

Bronze, per 100 kin.....	11.264	5.61	12.216	6.08
Zinc, per 100 kin.....			12.221	6.09
Asbestos in sheet or board, per 100 kin.....			1.268	.63
Cement, Portland, per 100 kin..	.089	.04	.102	.05
Chalk and whiting, per 100 kin..			.245	.12
Coal, per ton.....	.879	.44	1.129	.56
Coke, per ton.....	.789	.39	1.557	.78
Cordage and ropes of flax, hemp, jute, Manila hemp, or China grass (for rigging and other purposes), per 100 kin.....				
	1.954	.97	2.847	1.42
Dynamite, per kin.....	.100	.50	.061	.03
Glue (common), per 100 kin.....	.972	.48	.886	.44
Gunpowder (smokeless powder excepted), per 100 kin.....	2.617	1.30	4.944	2.46
Gypsum, per 100 kin.....	.055	.03	.064	.03
Packing for steam engines, per 100 kin.....			5.835	2.91
Pitch, per 100 kin.....	.187	.09	.149	.07
Wood tar, per 100 kin.....	.322	.16	.317	.16
Plaster of paris, per 100 kin....	.174	.09	.115	.08
Plumbago or black lead, per 100 kin.....	.730	.36	.991	.50
Putty, per 100 kin.....	.234	.12	.219	.11
Soapstone (in lump or powder), per 100 kin.....	.089	.04	.127	.06

## The Denison Planer Chuck.

The planer chuck here illustrated, made by the Denison Mfg. Company of Warren, Ohio, will hold either straight or taper work, and can be quickly changed from nothing to the greatest capacity, no blocking or packing being necessary. The jaws are so designed that the work will not be raised from the bed when the chuck is



THE DENISON PLANER CHUCK.

tightened. The screw posts are made of cast steel, and in the 15 and 18 inch chucks there are two screws instead of one, as shown in the cut. The jaws are laid with steel.

## The Youngstown Foundry &amp; Machine Company.

The Youngstown Foundry & Machine Company, says the Youngstown *Telegram*, had their origin in the Wallis Foundry, which was established in Girard in 1889 by W. J. Wallis and F. A. Williams. When the Girard Stove Works failed a stock company were organized who purchased the defunct company's plant and continued the manufacture of stoves under the name of the Girard Stove & Foundry Company. In July, 1894, the latter company purchased the plant of John Miller in Youngstown and moved both of their plants from Girard to Youngstown. In 1897 the stove business was sold and the company were succeeded by the Youngstown Foundry & Machine Company.

Many improvements have been recently made at the company's plant. A machine shop has been added with the latest improved tools, and the capacity of the plant has been trebled. Some large contracts have been turned out by the company, among which may be mentioned two continuous mills for the Brown-Bonnell plant of the Republic Iron & Steel Company, and one for the Republic Works at Moline, Ill. The company are in a most prosperous condition. Their work is of the highest order, and the plant is being run to its full capacity to fill contracts. The officers of the company are as follows:

President, Thomas Parrock; vice-president and general manager, W. J. Wallis; secretary and treasurer, F. A. Williams.

### Ore Briquetting Plant for Jones & Laughlin.

The Jones & Laughlin Steel Company of Pittsburgh have made a contract with the Henry S. Mould Company, Empire Building, Pittsburgh, to install an ore briquetting plant at the Eliza furnaces for the purpose of abating, if possible, the trouble from ore dust at the furnaces and at the same time effect an important economy in operations. The plant is to briquette 250 tons of flue dust a day. The plant will be experimental in only one feature, which is to determine if the briquettes will sustain the weight of the furnace charge. If this is done, of which those in interest have little doubt, there will have been another revolutionary innovation in blast furnace practice accomplished, and the Jones & Laughlin Steel Company will install a number of larger briquetting plants, which will put into compact blocks all of their fine Mesaba ores, as well as the flue dust. The secret liquid binder used is a comparatively recent discovery of Henry S. Mould, the inventor, and he says there is nothing about it that will affect the quality of the pig iron or injure the furnace lining. The plant at the Eliza furnaces is to be put in operation in 60 days. Work has started on its construction. Every practical test that could be applied to the briquettes of ore dust has been made, except as to the blocks holding against the weight of the furnace charge. The briquetting mechanism will be a complete system, operated automatically by electrical power. Thirty minutes from the time that the ore dust enters the press it comes out dried in blocks, and these will be carried by the automatic top fillers of the stacks to be at once used in charging the furnace. Automatically the ore dust is to be fed into the plunger press, which molds the briquettes. Tumbled from this over a belt conveyor the blocks of ore pass into cars, in which they are run into a tunnel drier and are then ready to be passed on without interruption to charge the furnace.

With the entire practical success of the innovation demonstrated, plants will be installed of sufficient capacity to briquette 80 per cent. of the fine Mesaba ore used by the company, who are said to lose over 13 per cent. by the dust escaping.

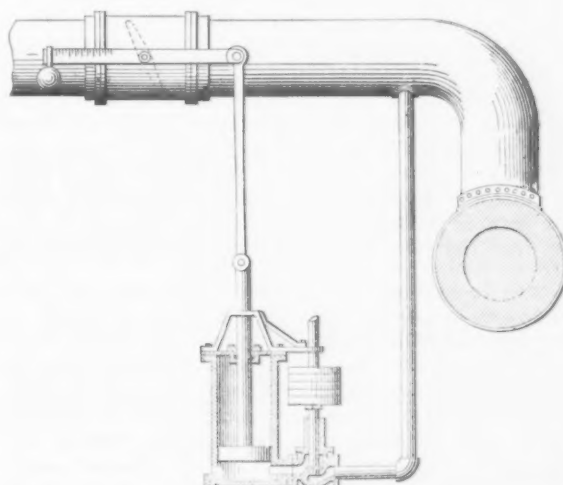
Henry S. Mould says of the weight of the charge in a furnace of 600-ton daily productive capacity in pig iron, and which he believes the briquettes will withstand, that with 540 tons of coke, 375 tons of limestone and 1085 tons of ore the burden is approximately 3000 tons. Under the present price of ore the loss of flue dust he declares to amount for such a furnace to \$89-425 a year. There are also losses which cannot be estimated in the passage of the flue dust through different parts of the furnace. Figuring from the most recent statistics of ore deliveries to the Pittsburgh district, he says that the furnacemen pay freight on water in their consignments from the Northwest to the amount of \$1,202,231 a year. If the briquetting system were used in the producing regions this item would be saved at once.

**The Calumet & Arizona Copper Mine.**—The party of directors and stockholders of the Calumet & Arizona Copper Mine who went to Bisbee to see the mine's new smelter blow in have returned to the East. The mine is doing even better than anticipated and is destined to make a very much more important copper producer than even its friends have dared prophesy. It is making a higher percentage of copper than had been hoped, and is making this from average ores. The second 300-ton smelting stack will be ready for operation early in the new year and a third is to be ordered at once, partly for use in case of accident, though the mine's development is such that it will be able to produce 900 tons of rock daily in a very short time. The mine is now developed for a small portion of its mineralized territory. Shipments of copper bullion have already been made to Eastern refineries and will be in large volume soon. Barring minor and unimportant accidents, the new smelter start-

ed off remarkably well. At both the Lake Superior & Pittsburgh and the Calumet & Pittsburgh development companies owned by the same interests as those owning Calumet & Arizona, the indications are now most encouraging, and it would not be surprising if at any time soon it should be reported that they had struck the rich copper leads that have been found in the Calumet & Arizona.

### Blast Regulator for Furnaces.

An illustration is herewith given of an automatic blast regulator for furnaces, for which a patent has been granted to John W. Cabot of Johnstown, Pa., and Samuel W. Vaughn of Lorain, Ohio. This device is shown attached to the main blast pipe which carries the hot blast to the furnace from the stoves. This pipe is connected with a cold blast supply pipe coming direct from the blowing engines, and therefore carrying cold blast at engine pressure, shown at the left side of the engraving and cut off from the main blast pipe by the valve represented by dotted lines. By means of the cold blast pipe, cold air may be mixed with the hot blast in the main blast pipe by opening the valve. This is accomplished by an operating lever having a counterbalance. Another small pipe is connected to the hot



BLAST REGULATOR FOR FURNACES.

blast pipe between this valve and the furnace, or it may also be connected at any point of the cold blast supply pipe between the blowing engine and the furnace. The other end is connected to a mechanism for operating the blast regulating valve. This mechanism, as shown in the patent drawing, herewith reproduced, consists in a self closing admission valve, having weights, connected by a port to an operating cylinder provided with a piston passing through a stuffing box and connecting with the operating lever of the cold blast admission valve.

Under normal conditions of blast pressure in the furnace the pressure in the small connecting pipe is not sufficient to raise the admission valve with which it is connected, and no blast pressure can get into the cylinder of the regulator. The cold blast admission valve remains closed and all blast passing into the furnace through the hot blast main is heated to the temperature of the hot blast stove through which it has just passed. If, however, the furnace pressure increases above the normal the pressure in the small connecting pipe increases correspondingly. The admission valve being weighted so that it is balanced by the normal pressure, the valve opens when the pressure increases, which allows the blast to enter the operating cylinder of the regulator to move the piston and open the cold blast valve. Cold blast then enters the hot blast main and reduces the temperature as much as desired. When the pressure falls to the normal the valves close. This device is designed to supersede the practice of working valves by hand to regulate the temperature of the blast.

## Blast Furnace Gas Engines and Their Work.—I.

Director Reinhardt of Dortmund, Germany, has presented at the meeting of the Verein Deutscher Eisenhuettenleute an admirable paper on modern blast furnace gas engines, which is both descriptive and critical, and gives a great deal of information which has not yet been brought to the attention of the metallurgical world. We take from it the following data:

In comparison of motors a series of considerations must be taken into account which I will enumerate in the order in which they appeared to me to possess importance:

1. Security in operation.
2. Quiet running.
3. Accessibility of those parts which must be most frequently inspected and cleaned.
4. Regulation.
5. First cost.
6. Consumption of lubricants.
7. Number of calories required per horse-power.
8. Space occupied.
9. Points affecting the coupling to dynamos or blowing engines.
10. Consumption of water.
11. Balancing of masses.
12. Elegance of design.

Naturally this order will be somewhat changed according to special considerations.

Before taking up individual designs I desire to say a few words concerning the Otto four-cycle motor, which is now being built by all engine works, and to give some data relative to its operation. The single acting four-cycle motor is generally and exclusively used for larger units without guides or cross heads, as indicated in Fig. 1, so that the cylinder itself represents the guides and

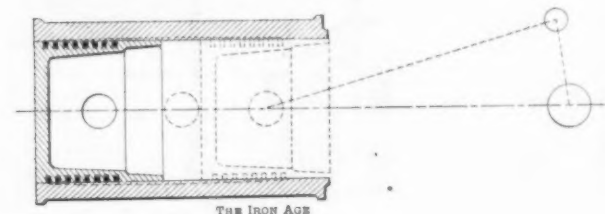


Fig. 1.—Section of Piston.

the long piston takes the functions of the cross head. This type of motor can of course be produced more cheaply than the cross head motor and is therefore preferred by those selling engines. It is stated also that experience has proved that the gas consumption is less than that of a motor with cross head. This may possibly be explained by the fact that it is very difficult to attain absolute accuracy in building together the cylinder and the guides and to bring into line the cross head with its connections. The result is that probably with every stroke the piston rod bends and therefore brings about unnecessary friction. But after a cylinder has undergone a certain amount of wear this friction disappears; then, according to my opinion there is no reason for a larger consumption of gas in the case of cross head motors.

It is the practice in many, although not all, gas engine works to fit the piston during the trial run at the works under loads gradually increased in such a manner that at its maximum power it does not pound and has a bearing all over. This is done not alone because the piston when performing the function of a cross head must accurately fit into its guides, but also because the piston itself and not rings alone must contribute to the packing. The work of fitting requires very experienced men, because the piston expands more freely than the cylinder, so that those parts which must be removed from the piston are indicated only by increased friction. The workmen can only estimate by hearing the time when those parts which bind are sufficiently indicated without

any injury to the cylinder. Further on we shall see what value this difficult piece of work has in the long run.

As a rule the gas engine has from five to ten piston rings, all of which in the case of the piston motor are located at the back end of the piston between the piston end and the piston bolt. These rings wear out the cylinder by their 10 to 20 edges in presence of the unavoidable residues of combustion very much more rapidly than is the case in steam engines. The front part of the cylinder, which is not touched by the rings, shows almost no wear, while the middle part of the cylinder, which is in contact with all of the rings, shows the greatest wear. As indicated in Fig. 1, the wear decreases toward the end. The result of this is that in time a ridge forms in the cylinder near the crank end which makes it difficult to take out the piston. Therefore this ridge must be as frequently removed as is possible, so that the piston may be withdrawn later on. Besides this, the space between the inner surface of the piston rings and of the piston proper in the ring notches fills up with oil and the products of combustion. These substances adhere by burning, so that the rings do not have as much play as they had at first, and often they stick altogether, a thing that may lead to leakage of the piston.

It is a very difficult thing under such circumstances, in the case of older engines, to take out that part of the piston which is supplied with the rings which cannot be longer compressed. For this reason it is well to take out the piston more frequently, even when there is no direct cause for the operation, and to clean the rings in the well-known manner. For large engines this is certainly a disagreeable feature. The causes might be lessened to some extent if the rings were distributed over the entire length of the piston, so that one ring at least covers its course the entire length of the cylinder. It is urged against this arrangement, which has been adopted by some, that the first ring is apt to strip off the oil and to eject it from the cylinder, so that the result is an excessive consumption of lubricant.

The wear of the cylinder referred to is usually so large in the first few months that accurate fitting of the piston has become valueless. The piston acting as a cross head has thus developed play in its guides. Particularly during the compression stroke it is lifted and then falls back again. In the case of small engines the blows thus created are not of importance, but they are very troublesome with large engines, particularly when the piston bolt does not pass through the center of gravity of the piston.

A further result of the wearing of the cylinder is that the piston itself does not contribute to packing, and unless the rings from the outstart or by corresponding wear do not perform this function the motor leaks. It is therefore well to depend upon the rings at the outstart for preventing leakage, and to give up the plan of fitting the piston. For larger powers only engines with guides and cross head should be purchased.

The cross head motor has the further advantage that the cross head bearing, which is one of the most difficult details with large engines, is no longer placed in the hot piston, where it always proves troublesome. Besides the same number of piston rings might be distributed over a greater length, and in that manner leakage might be avoided and uniform wear of the cylinder be reached. A further property of the single acting four-cycle motor, at least one designed as a cross head motor, is the exceptionally quiet working of the connections. This is due to the fact that the alterations in pressure always take place under favorable circumstances. As contrasted with the steam engine the loading of the motor has no influence upon this quiet action, at least in those cases when the regulation does not at the same time change the degree of compression. Therefore it is the general practice to regard as superfluous in the case of the ordinary four-cycle motor an arrangement for taking up wear of the crank bearing. The construction becomes a simple one and permits the use of economical oiling appliances.

A further advantage of the open four-cycle motor is that the piston can be readily taken out for the purpose of cleaning so long as the wear of the piston has not be-

come excessive. It is possible, too, to control the tightness of the piston and to a certain extent the oiling of the same when it is in operation.

When the piston becomes increasingly leaky the efficiency declines and the exhaust gases eject the cylinder oil, thus raising the temperature of the surfaces and causing corrosion of the piston or the rings and the cylinder. It is certainly a matter of great importance that in the case of the open four-cycle motor this fact may be at once observed and may be counteracted, at least for a short time, by a more liberal use of lubricant and possibly by stopping the engine at the right time.

The simple construction and the undoubted advantages of the open four-cycle motor were possibly the reasons why the designers were loath to abandon it when taking up the building of large engines. The disadvantages—namely, the relatively low uniformity, which cannot even be expressed in the case of arranging the four-cycle motor as a duplicate machine, and furthermore the probable limits in the size of the parts—led to different combinations of the four-cycle cylinder. In the case of all these engines the maximum size of the unit was limited by fear as to the safety of the cylinder heads for large sizes. In small gas engines the inlet valve is usually placed below and the exhaust valve at the side

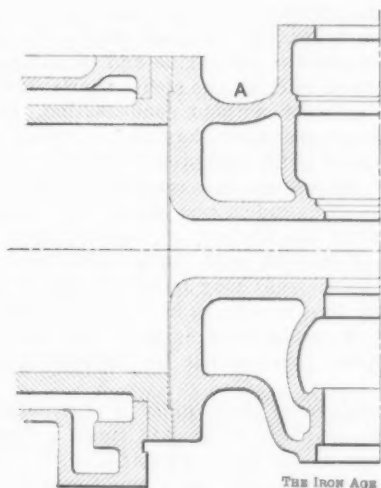


Fig. 2.—Section of Cylinder Head.

of the cylinder head in a casing screwed onto the same. It is a rare occurrence that the heads, which are arranged ball shape in the interior, become defective. This is generally the result of a heavy deposit of scale in the cooling jacket, or of freezing in winter. With reference to the valve motion, one valve, in the case of larger motors, has been placed in the lower part of the cylinder head and the other vertically above it. This arrangement, in itself good so long as it was a question only of two valves, requiring specially fitted valve cages, and it was not always practical to attain easy cleaning of the valve, because in order to effect this the whole valve cage had to be removed, and under certain circumstances a part of the valve gear had to be taken down. An effort to meet this difficulty has been made by placing both valves side by side in the inner wall and locating above each valve a tubular opening closed by cover and through which the valve could be readily drawn out upward.

So far as the cleaning of the valves and the inner part of the cylinder head is concerned this design is therefore advantageous, but it leads to an unfavorable shape of the cylinder head with reference both to the surface of the compression chamber and to the danger which lies in a short stiff connection between the outer and inner walls of the cylinder head at places which are exposed to stresses due to the different temperatures between the outer and the inner wall. Soon after these heads were introduced the reports appeared that they cracked very readily, particularly so far as the outer wall exposed to tension stresses is concerned.

This began the difficulties with the cylinder heads,

and they increased still more since designers did not immediately decide in the case of the larger cylinder heads to return to the former design of two valves placed one above the other, the outlet valve being cooled with water through a hollow spindle. Designers persisted in the construction of four valves placed side by side in the lower inner wall. Now that the better arrangement has been adopted with all larger four-cycle motors, the hope seems justified that danger of cracking is not as great as it was at one time. The new heads of the larger engines are generally made of annealed steel castings, so that it is probable that so far as material is concerned they cannot be very much improved.

I am inclined to doubt, however, whether cast iron cylinder heads which have cracked, when supplanted by steel castings will prove more durable in the long run, particularly if there has been no change in the design.

Mr. Reinhardt goes into a somewhat elaborate discussion of this point which we need not reproduce at this time.

A further danger in the case of large cylinder heads is the thickness of the cylinder head flange, Fig. 2. This flange is cooled only at one surface, and is exposed to the highest temperatures on the other surface, the contrast being particularly great as compared with the outer wall A. A very heavy flange is therefore very dangerous in itself, even if it is cooled, because the accumulation of heat creates stresses upon the rim.

Questions addressed to the steel works which have gas engines in operation have shown that many of them did not at first work quite satisfactorily, but that the builders have succeeded in putting the plant into a satisfactory condition. It must be admitted that the gas engine, aside from the new designs which have been planned by some firms, has proved on the whole a machine which can be utilized by the iron industry.

I must confess that the following difficulties seem to me to be likely to affect adversely the introduction of the gas engine and the value of those already in operation: The difficulties of starting in the case of poor gas, or of correct position of the gas valve, the loss of time which grows out of repeated failure to start, so that the air tank must be pumped full again; the premature ignition which is to be feared at certain intervals with large engines; the disturbances created by possible refusal of the igniting appliance; the necessity of removing the piston and the valves for the sake of cleaning them, which occurs frequently as compared with steam engines; the irregularities in running with many gas engines when they are lightly loaded, or run without a load, and the experiences with some cylinder head designs and some cylinder arrangements.

Apparently all these disturbances do not occur as often or are not so troublesome as was thought probable, as the works engineers have soon accepted them, reaching the conclusion that they must be taken into the bargain in view of the other advantages of the gas engines. It seems that the device of starting with compressed air works without trouble. Against poor gas in starting provision may be made by allowing gas to escape, after prolonged stops of the engines, until it burns with a long blue flame, and certainly of igniting may be attained by arranging for two igniting devices. Starting a cold engine is sometimes difficult, particularly when moisture has developed in the interior and specially in the igniting apparatus, so that there is no spark. In order to prevent this steam has been introduced into the water jacket of the cylinder head, and it is sufficient, too, to take out the igniting apparatus and warm it.

A short review of the development of the gas engine in iron manufacture shows at the outset that the Oechselhaeuser two-cycle motor was competing with the four-cycle engine without leading to any remarkable progress in either system. Possibly the reason was that the early Oechselhaeuser engine, as at first installed at Hoerde, worked with a mixture pump, and therefore there was a large quantity of explosive mixture before the working cylinder. The regulation, too, was inadequate, the whole engine was not simple and required much room in spite of the fact that there was no valve gear on the working cylinder. It was known, too, that one of the crank shafts had broken. In brief, the representatives of the

single acting four-cycle motor did not believe it necessary to make special efforts in competition with the early type of the Oechselhaeuser engine. The result was that there appeared, almost simultaneously, the well-known four-cycle combinations of the Gasmotorenfabrik Deutz of the Société Cockerill at Seraing, of Gebrueder Koerting and of the Maschinenbau Gesellschaft Nuernberg.

In the meantime Koerting busied himself with the building and testing of first a double acting four-cycle motor and later a double acting two-cycle motor, with the well-known success. Koerting's success was probably the reason why other gas engine builders took up the revision of their ideas and now recommend the double acting four-cycle motor as the best engine.

With all these engines the igniting is now only effected by the electric spark. Water cooling of the piston has been generally adopted for cylinders of 150 horsepower and upward. It is a minor complication which has proved effective. It is certain that the cooling of the piston reduces leakage, decreases the consumption of lubricants, lessens the chances of premature ignition by the burning on and glowing of a crust on the piston end and the clogging of the piston rings. A cooled piston need not be taken out so frequently to be cleaned, as is necessary with an uncooled piston. Packing boxes are also quite generally used with gas engines without giving more trouble than they do with large steam engines.

### Superheated Steam.\*

BY E. H. FOSTER.

While in the march of progress we have been gradually raising our steam pressures we have kept pace with the corresponding increase of temperature by improvements in construction until we find that we have already removed the barriers and paved the way for the introduction of superheated steam. Fortunately for us a revival of this practice was inaugurated in other countries some 15 years ago, or long enough to build up a mass of experience which has materially aided us in taking up the work where European engineers, and particularly the Germans, have left off. While it is difficult to form an exact estimate, there have probably been as many as 7000, and possibly more, superheaters successfully installed by European manufacturers during the past 10 or 15 years, and the fact that the number of installations is rapidly increasing is the best proof that they are on the right track.

Not many years ago the question of how to obtain superheat in our steam might have been difficult to answer. Much of the indifference to superheated steam has been due to the unreliability of the superheater, which has not always been of proper design, but at the present time there is no difficulty in obtaining a suitable and efficient apparatus at a reasonable cost. There are several good makes on the market, each possessing advantages of its own.

The general method of superheating steam is to take the saturated steam from a boiler drum and pass it through coils surrounded by heated gases. The coils may be placed within the boiler setting so as to intercept the gases from the boiler furnace in their passage through the boiler, or they may be placed in a setting independent of the boiler and supplied with heat by a furnace of their own, or they may be set outside of the boiler and supplied with heat by drawing a portion of the hot gases from the boiler furnace, passing it through the superheater and returning it to the boiler or economizer. The choice of a system must depend largely upon local conditions, such as space available, the style and size of boiler in use, arrangement of the steam piping, type of engines adopted and their location with reference to the boilers.

The coils are made of seamless drawn steel tubing, or of cast iron of a suitable composition to stand high temperatures, important advantages being claimed for each. Whatever the method of construction adopted, the material used must be of the very best and the joints and connections made in the most approved manner and with

the greatest care. With such precautions as are now considered good practice the superheater may be depended upon as safely as the boiler, or engine, or any other part of the plant.

#### Advantages of Superheating.

In considering the advantages and disadvantages of superheating with regard to engine work, let us recognize the four distinct conditions under which steam is used:

Saturated.

Superdried.

Moderately superheated.

Highly superheated.

Saturated steam may be taken as commercially dry steam, or such as is delivered by a good boiler under ordinary conditions.

By superdried steam we mean steam which is not only thoroughly dried in the superheater, but which is raised in temperature 30 or 40 degrees above the saturation point, or just enough to insure its arriving at the engine in a perfectly dry state. To such an arrangement there could possibly be no objection, as the steam is delivered at the engine free from moisture and without the use of a separator or means of trapping out condensation.

By a moderate superheat we mean from 100 to 150 degrees at the boiler, which should give in the neighborhood of 100 degrees at the engine and be sufficient, with proper protection, to carry the steam nearly, if not quite, through one cylinder without condensation. If the engine is compound the steam, having lost its superheat at the terminal point of the high pressure cylinder, is resuperheated about 100 degrees in a reheater between the high and low pressure cylinders and again loses its superheat while expanding into the low pressure cylinder, arriving at the point of exhaust with the temperature of saturation. This arrangement may be considered at the present time as the best which can be proposed. The amount of superheat is so moderate as not to require anything more than good construction for modern high steam pressure.

Highly superheated steam must be treated with more consideration. Engines which will stand a temperature of 500 degrees F. are not necessarily fitted to handle steam at 750 degrees, but these temperatures may be, and have been repeatedly, used successfully.

As shown by many published reports of tests at various points of superheat an increase in temperature is accompanied by a decrease in steam consumption, hence it is worth while pursuing this line. To employ these high temperatures it is at present considered important to use poppet valves on the high pressure cylinders at least, as it is here that the full effect of the superheat is felt, and this type of valve is easier to lubricate and does not become distorted with heat. We believe, however, that a Corliss valve may be so proportioned as to operate successfully under even these conditions.

#### The Schmidt System.

One of the well-known methods of utilizing high superheat is that known as the Schmidt system. This consists in passing a portion of the highly superheated steam directly from the boiler through the reheating tubes of a receiver, between the high and low pressure cylinders of a compound engine, and then letting this steam mix with that which enters the high pressure cylinder direct from the boiler. The high pressure exhaust is thus superheated on its way to the low pressure cylinder while the temperature of the steam admitted to the high pressure cylinder is modified by its admixture with steam which has already been through the reheater coils and incidentally a receiver drain is unnecessary. Automatic regulation of the superheat to a desirable point in each cylinder, under a varying load, is claimed for this system. Ordinarily an increase of load beyond normal, necessitating a late point of cut off in the high pressure cylinder, will give an excess of superheat in this cylinder, while the reheater will not be sufficiently active to superheat this steam on its way to the second cylinder. With the Schmidt system, however, the effect is reversed by causing a greater amount of steam to pass through the receiver coils where it gives up its su-

\* From a paper read before the Engine Builders' Association, New York meeting, December 1, 1902.

perheat to the low pressure cylinder during periods of heavy draft, and the high pressure cylinder is thus protected from excessive heat. The contrary effect in both instances may be followed through in case of an engine running under a light load.

#### Moderate Superheating.

In the present state of the art it would seem that the condition most attractive to American engine builders would be one of moderate superheat. We thus confine ourselves to a conservative policy and avoid the necessity for making any special provision for extremely high temperature. We use lubricants and gaskets and packing which may be obtained in the open market at a reasonable cost, while at the same time we avail ourselves of such positive and direct benefits of superheating as:

- Dry steam in the pipes and throughout the engine.
- Elimination of separator.
- Low steam consumption per unit of work done.
- Smaller steam pipes and ports.
- Simplified system of steam jackets.
- Greater amount of work done per boiler capacity.
- Efficiency at light loads.

These are all practical and common sense improvements, and are of such proportion as to fix our attention.

The absence of water with the steam need not be dwelt upon. Every practical man will admit that this is of great value. It is further noticeable that a steam pipe system which will show leakage at the joints with saturated steam will become perfectly tight under superheated steam.

The point of maximum economy, while using superheated steam, has by no means been reached. The amount of data available is not in proportion to the extent of the practice. In order to make a comparison between superheated and saturated steam consumption of an engine it is, of course, only fair to place both on a heat unit basis, thus eliminating entirely the question of the cost of the superheat. Assuming a compound engine of about 1000 horse-power and running with 150 pounds initial and 26-inch vacuum, we would consider 12½ pounds of fuel per indicated horse-power per hour a very good result. We have well authenticated reports of a similar engine, supplied with steam with a temperature of 720 degrees F. at the boiler, consuming less than 9 pounds of steam per indicated horse-power, or a gain of 39 per cent. in economy with an expenditure of but 16 per cent. more heat units in the boiler.

The reduction in the size of steam pipes and ports rendered possible by using superheated steam is due to the diminished density of an equal volume as compared with saturated steam as well as from the absence of entrained water. The velocity of superheated steam in pipes should be kept up in the neighborhood of 6000 feet per minute. As a rough approximation it may be said that superheating will make a difference of 20 per cent. in the size of the steam pipe.

The question of steam jackets on a cylinder, which has occupied so much profound attention in recent years, is quickly solved by the aid of superheated steam, and we see at once the benefit of the jacket disappear as a steam economizer. There seems to be no excuse for retaining them on the low pressure cylinder, and indeed we have proved by trial that on this cylinder a steam jacket is positively wasteful. We do not think it is clearly proved, however, that they may not still be useful when applied to the high pressure cylinder, even if only for the sake of warming a large engine up preliminary to starting.

The effect of getting more work out of a certain volume of steam is naturally felt in the handling of the boilers and in a reduction in the number of fires necessary to do a given amount of work.

Unexpected results have been frequently obtained by the addition of a superheater to a boiler and a higher evaporative efficiency with the superheater in commission has been shown. This is doubtless due to the increase of the heating surface and the lowering of the temperature of the fine gases. In such cases the saving by superheating is felt in the coal pile to the same extent as in the steam consumption.

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gines of 1200 and 2400 horse-power on electric light service in Boston the maintaining of efficiency under light loads was well demonstrated. The feed water per indicated horse-power per hour was 12.54, 12.51 and 12.06 pounds at full load, three-quarter load and one-half load respectively, while the amount of superheat was 80 degrees, 64 degrees and 48 degrees at the high pressure admission and 60 degrees, 67 degrees and 84 degrees at the low pressure admission. The engine had reheaters and steam jackets on both cylinders, and it is not unlikely that still better results would have been obtained had the low pressure jackets been omitted.

#### Preparations for the Use of Superheated Steam.

It must not be considered necessary to make any very extensive preparations for the use of superheated steam. It may almost be said that the requirements are merely in the line of good practice, and, as such, should be inaugurated in any event. It is important to have the joints of the steam pipes firmly made and well bolted; corrugated brass gaskets are usually found very satisfactory with superheated steam. Provision must, of course, be made for the expansion and contraction of the steam lines to a somewhat greater extent than ordinarily, and the steam pipes, as well as the flanged unions, should be covered with a good nonconducting material in a thick layer. It is important to have the flanged unions covered as well as the pipe.

With proper precautions of this sort and with a velocity of steam in the pipes of from 4000 to 6000 feet per minute, the drop in temperature per foot of run may easily be kept down to 1 degree in 6 or 7 feet of length.

Metal of low melting point must, of course, be avoided in the construction of the engine, especially about the valves and piston rods. The stuffing box bushings must be made of metal which will not run under the temperatures likely to be encountered. The metal should be uniformly distributed in designing the valves and cylinders to get the best results with superheated steam, as in this way a uniform expansion by heat is provided for. The barrels of the cylinders are preferably made without projections or ribs. The poppet valve has the advantage in form, but the Corliss valve is also made in such a manner as to expand and contract without warping, and the large number of Corliss engines using superheated steam is a strong evidence of their adaptability.

The lubrication of the cylinders is apt to cause one who has not had experience with superheated steam a great deal of unnecessary anxiety, but really this problem is very simple. It must be borne in mind that the temperature inside of the cylinder is never very high, even when the superheat at the entrance is very considerable, and if the cylinder is lubricated directly without mixing the oil with the steam at the entrance point there can possibly be no difficulty. With any reasonably good grade mineral oil, however, it cannot be claimed that any difficulty has been experienced with the lubrication of the parts, even when applied in the ordinary way.

The effect of superheated steam in the indicator diagrams is worthy of notice. Steam being used as a perfect gas, the diagram approaches more nearly the theoretical, and, as there can be no re-evaporation in the cylinder the tendency of the pressure to rise during the stroke is absent and the amount of work done in the low pressure cylinder is brought down to the proper point. In designing an engine to be run with superheated steam it is well to bear this point in mind, as there is danger of applying the usual constants in the selection of the size of the cylinder, for the reason that the horse-power of the steam end used with superheated steam will be nearer the theoretical.

Although there has been less experience in using superheated steam on locomotives, it cannot be said that this field is of minor importance. Trials have been made on the Canadian Pacific Railway, and are now being conducted on the Pennsylvania Railroad, which will doubtless contribute much to the knowledge of this subject. In the former instance it was found that by the addition of a superheater a simple engine weighing 204,000 pounds was enabled to do 60 per cent. better in equivalent ton miles hauled per ton of coal than a similar engine without superheated steam, and 30 per cent. bet-

single acting four-cycle motor did not believe it necessary to make special efforts in competition with the early type of the Oechselhaeuser engine. The result was that there appeared, almost simultaneously, the well-known four-cycle combinations of the Gasmotorenfabrik Deutz of the Société Cockerill at Seraing, of Gebrueder Koerting and of the Maschinenbau Gesellschaft Nuernberg.

In the meantime Koerting busied himself with the building and testing of first a double acting four-cycle motor and later a double acting two-cycle motor, with the well-known success. Koerting's success was probably the reason why other gas engine builders took up the revision of their ideas and now recommend the double acting four-cycle motor as the best engine.

With all these engines the igniting is now only effected by the electric spark. Water cooling of the piston has been generally adopted for cylinders of 150 horsepower and upward. It is a minor complication which has proved effective. It is certain that the cooling of the piston reduces leakage, decreases the consumption of lubricants, lessens the chances of premature ignition by the burning on and glowing of a crust on the piston end and the clogging of the piston rings. A cooled piston need not be taken out so frequently to be cleaned, as is necessary with an uncooled piston. Packing boxes are also quite generally used with gas engines without giving more trouble than they do with large steam engines.

### Superheated Steam.\*

BY E. H. FOSTER.

While in the march of progress we have been gradually raising our steam pressures we have kept pace with the corresponding increase of temperature by improvements in construction until we find that we have already removed the barriers and paved the way for the introduction of superheated steam. Fortunately for us a revival of this practice was inaugurated in other countries some 15 years ago, or long enough to build up a mass of experience which has materially aided us in taking up the work where European engineers, and particularly the Germans, have left off. While it is difficult to form an exact estimate, there have probably been as many as 7000, and possibly more, superheaters successfully installed by European manufacturers during the past 10 or 15 years, and the fact that the number of installations is rapidly increasing is the best proof that they are on the right track.

Not many years ago the question of how to obtain superheat in our steam might have been difficult to answer. Much of the indifference to superheated steam has been due to the unreliability of the superheater, which has not always been of proper design, but at the present time there is no difficulty in obtaining a suitable and efficient apparatus at a reasonable cost. There are several good makes on the market, each possessing advantages of its own.

The general method of superheating steam is to take the saturated steam from a boiler drum and pass it through coils surrounded by heated gases. The coils may be placed within the boiler setting so as to intercept the gases from the boiler furnace in their passage through the boiler, or they may be placed in a setting independent of the boiler and supplied with heat by a furnace of their own, or they may be set outside of the boiler and supplied with heat by drawing a portion of the hot gases from the boiler furnace, passing it through the superheater and returning it to the boiler or economizer. The choice of a system must depend largely upon local conditions, such as space available, the style and size of boiler in use, arrangement of the steam piping, type of engines adopted and their location with reference to the boilers.

The coils are made of seamless drawn steel tubing, or of cast iron of a suitable composition to stand high temperatures, important advantages being claimed for each. Whatever the method of construction adopted, the material used must be of the very best and the joints and connections made in the most approved manner and with

the greatest care. With such precautions as are now considered good practice the superheater may be depended upon as safely as the boiler, or engine, or any other part of the plant.

#### Advantages of Superheating.

In considering the advantages and disadvantages of superheating with regard to engine work, let us recognize the four distinct conditions under which steam is used:

Saturated.

Superdried.

Moderately superheated.

Highly superheated.

Saturated steam may be taken as commercially dry steam, or such as is delivered by a good boiler under ordinary conditions.

By superdried steam we mean steam which is not only thoroughly dried in the superheater, but which is raised in temperature 30 or 40 degrees above the saturation point, or just enough to insure its arriving at the engine in a perfectly dry state. To such an arrangement there could possibly be no objection, as the steam is delivered at the engine free from moisture and without the use of a separator or means of trapping out condensation.

By a moderate superheat we mean from 100 to 150 degrees at the boiler, which should give in the neighborhood of 100 degrees at the engine and be sufficient, with proper protection, to carry the steam nearly, if not quite, through one cylinder without condensation. If the engine is compound the steam, having lost its superheat at the terminal point of the high pressure cylinder, is resuperheated about 100 degrees in a reheater between the high and low pressure cylinders and again loses its superheat while expanding into the low pressure cylinder, arriving at the point of exhaust with the temperature of saturation. This arrangement may be considered at the present time as the best which can be proposed. The amount of superheat is so moderate as not to require anything more than good construction for modern high steam pressure.

Highly superheated steam must be treated with more consideration. Engines which will stand a temperature of 500 degrees F. are not necessarily fitted to handle steam at 750 degrees, but these temperatures may be, and have been repeatedly, used successfully.

As shown by many published reports of tests at various points of superheat an increase in temperature is accompanied by a decrease in steam consumption, hence it is worth while pursuing this line. To employ these high temperatures it is at present considered important to use poppet valves on the high pressure cylinders at least, as it is here that the full effect of the superheat is felt, and this type of valve is easier to lubricate and does not become distorted with heat. We believe, however, that a Corliss valve may be so proportioned as to operate successfully under even these conditions.

#### The Schmidt System.

One of the well-known methods of utilizing high superheat is that known as the Schmidt system. This consists in passing a portion of the highly superheated steam directly from the boiler through the reheating tubes of a receiver, between the high and low pressure cylinders of a compound engine, and then letting this steam mix with that which enters the high pressure cylinder direct from the boiler. The high pressure exhaust is thus superheated on its way to the low pressure cylinder while the temperature of the steam admitted to the high pressure cylinder is modified by its admixture with steam which has already been through the reheater coils and incidentally a receiver drain is unnecessary. Automatic regulation of the superheat to a desirable point in each cylinder, under a varying load, is claimed for this system. Ordinarily an increase of load beyond normal, necessitating a late point of cut off in the high pressure cylinder, will give an excess of superheat in this cylinder, while the reheater will not be sufficiently active to superheat this steam on its way to the second cylinder. With the Schmidt system, however, the effect is reversed by causing a greater amount of steam to pass through the receiver coils where it gives up its su-

\* From a paper read before the Engine Builders' Association, New York meeting, December 1, 1902.

perheat to the low pressure cylinder during periods of heavy draft, and the high pressure cylinder is thus protected from excessive heat. The contrary effect in both instances may be followed through in case of an engine running under a light load.

#### Moderate Superheating.

In the present state of the art it would seem that the condition most attractive to American engine builders would be one of moderate superheat. We thus confine ourselves to a conservative policy and avoid the necessity for making any special provision for extremely high temperature. We use lubricants and gaskets and packing which may be obtained in the open market at a reasonable cost, while at the same time we avail ourselves of such positive and direct benefits of superheating as:

- Dry steam in the pipes and throughout the engine.
- Elimination of separator.
- Low steam consumption per unit of work done.
- Smaller steam pipes and ports.
- Simplified system of steam jackets.
- Greater amount of work done per boiler capacity.
- Efficiency at light loads.

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ter than a compound engine without superheated steam. We should expect better results from a compound engine with superheated steam, and doubtless later experiments will bring out this feature. It is of inestimable importance to railroads if, as is apparently true, that with the same boiler power they are able to use larger cylinders and haul more cars.

Superheated steam is destined to play an important part in the adoption of the steam turbine. Already a number of tests have been published which show a considerable decrease in the steam consumption with the amount of superheating, and it is not difficult to understand that a machine of this type would be greatly benefited, even by the elimination of moisture and dense vapor from the propelling medium.

Other uses for superheated steam, such as for dryers, chemical processes and boiling or distilling apparatus, will not be touched upon in this paper, and it may be said in conclusion that the author believes that the time has arrived when steam will not be used to any great extent in any branch of industry without being superheated.

## Navy Recommendations.

### Abstract of Secretary Moody's Report.

WASHINGTON, D. C., December 2, 1902.—The annual report of the Secretary of the Navy, which has been transmitted to the President, contains a number of unusually important recommendations and will command general attention both in and out of Congress. Secretary Moody makes a strong plea for the upbuilding of the navy and especially for legislation to increase the number of officers in the service, the present number being inadequate for the operation of the vessels of the navy and those in course of construction; he gives notice to contractors behind in their work that they will be held accountable for failure to push the construction of ships with due diligence; he suggests the establishment of new naval stations in the Philippines and in the West Indies, and devotes considerable space to a discussion of the liquid fuel problem, presenting carefully revised conclusions of the Bureau of Steam Engineering with regard to the recent tests made by the Edwards Board. With regard to the future of the navy the Secretary says:

"Among the most important lessons learned in the war with Spain was that a modern navy cannot be improvised during a war or upon the threshold of a war. Much money was then expended in the purchase of ships. Many of them served useful auxiliary purposes; it may well be doubted whether they added materially to the fighting efficiency of our fleet. The time best suited to the development and perfection of our navy is the time when there is neither war nor threat of war." Continuing, the Secretary describes the imperative need of the navy for additional officers. He recommends that legislation be enacted permitting the promotion from the ranks of 12 warrant officers per annum, instead of six as at present, and an increase in the number of midshipmen at the Academy "sufficient to meet present and prospective needs of the service." With regard to the increase of the navy the Secretary says:

#### A Bigger Navy Recommended.

"After most careful consideration I believe it to be my duty to recommend a continuance without interruption of the increase of ships. Differences of opinion exist among naval authorities, but all agree that not less than two battle ships should be among the number authorized. Whether the others should be of the armored cruiser type or the unarmored cruiser and gunboat type which have proved so useful may well be left for future discussion. A permanent ambulance or hospital ship, designed for hospital purposes only, and having the right to fly the flag of the Geneva Conference, would undoubtedly prove an important adjunct to extended naval maneuvers, whether in time of war or peace. The work of the "Solace" and "Bay State"

throughout the period of the Spanish War, in the West Indies and during subsequent activities in the Far East, established the value of hospital ships. Two vessels of this type, one for the Atlantic and one for the Pacific, to be equipped for the work outlined in time of peace, and ready for instant service in time of war, are earnestly recommended."

Referring to the vessels authorized by Congress at the last session, the Secretary describes the letting of the contract for the construction of the "Louisiana" to the Newport News Shipbuilding & Dry Dock Company and the arrangements made for the building of her sister ship, the "Connecticut," at the New York Navy Yard. He states that the plans and specifications for two 14,500-ton armored cruisers, the "Tennessee" and "Washington," are completed and bids for construction will be opened January 6, 1903. The plans and specifications of the 1000-ton gunboats, the "Dubuque" and "Paducah," will soon be ready. Concerning the "Connecticut" and "Louisiana" he says: "These two vessels are to be battle ships in the strictest sense, equipped with the most powerful guns and protected by the heaviest armor in use in the navy. In making provisions, separately from the battle ships, for the two vessels referred to as the 'Tennessee' and the 'Washington,' as well as by designating them as 'armored cruisers,' Congress made plain its desire that they should be vessels of a different type. In drawing the plans and specifications this purpose has been kept in view and accordingly they are to have less armor protection and lighter batteries. Inasmuch as speed is an important characteristic of vessels of the cruiser class, the speed to be attained by the 'Tennessee' and the 'Washington' has been placed at 22 knots, with a margin, under penalties, of one-half knot."

#### Slow Progress on New Vessels.

Referring to the progress made on vessels now under construction the Secretary says:

"At the close of the last fiscal year there were under construction for the navy by contract the following vessels: Eight battle ships, 6 armored cruisers, 9 protected cruisers, 4 monitors, 13 torpedo boat destroyers, 7 torpedo boats and 7 submarine torpedo boats. The general progress of work upon these vessels, particularly those of the larger class, has not been found to be satisfactory. The battle ships were on June 30, 1902, from 10 to 29 months behind contract time, the armored cruisers from 4 to 13 months, the protected cruisers from 6 to 18 months, while the monitors were from 16 to 19 months in arrears. In the cases of the larger vessels the causes assigned for slow progress are the non-delivery of structural material, the inability of shipbuilders to obtain a sufficient supply of skilled labor and in some cases strikes. Other causes have contributed to the result. The Department has recently taken steps to remove, as far as practicable, any grounds of delay over which it can exercise control, and has notified contractors that they will be held to accountability for failure to push forward the work of construction with due diligence, if such failure shall occur, and particularly for any delays which may at any time be caused by preference being given to private over public work. In the case of torpedo boats and the destroyers, the contractors have assigned as an additional reason for delay that the contracts for their construction were so exacting that compliance with them has been well nigh impossible."

#### Matters of General Interest.

Special interest attaches to the Secretary's observations concerning the liquid fuel problem, for although the question has been before the Department for a number of years it has not heretofore been considered of sufficient importance to command attention in the Secretary's annual report. His conclusions, however, have been largely anticipated in the report of the Bureau of Steam Engineering, printed in *The Iron Age* for October 30.

Concerning the development of ordnance in the navy, the Secretary says that 233 guns, chiefly of large caliber,

have been manufactured at the Naval gun factory, making a total of 1210 guns thus far made at that establishment. No material change has been made in the method of gun construction, except that the tubes of all guns of and above 6 inches in caliber are now reinforced to the muzzle. Very great increase in energy has, however, been obtained by increasing the length and weight of guns and by the use of smokeless powder. The manufacture of armor has progressed satisfactorily, 7612 tons having been delivered at the various shipyards during the past year and a considerably larger quantity will probably be delivered during the ensuing year. The armor manufacturers recently made a voluntary reduction of 10 shillings per ton in royalty for the Krupp process. The manufacture and introduction of smokeless powder has been proceeded with as rapidly as practicable. Beginning with the "Kearsarge" and "Kentucky," all the new ships of the navy and some 30 of the older vessels have been supplied with smokeless powder. No other powder has been bought or manufactured for the navy since 1898, except for auxiliary purposes. The most interesting event of the year in connection with projectiles is the development of a new type of shell having the perforating power of an armor piercing projectile, with a capacity for a large bursting charge. Several lots of such projectiles have passed the required test of "perforating unbroken a plate of hard faced armor a caliber in thickness, remaining in condition for effective bursting."

In recommending the establishment of naval stations in the Philippines and in the West Indies, the Secretary urges that the naval committees of Congress should personally visit the islands, as he is confident that such an inspection would "insure the selection of proper sites and their development on wise and economic lines." Concerning the wireless telegraphy experiments which are now being made by the Bureau of Equipment, the Secretary calls attention to the fact that the operation of any wireless transmitting apparatus will affect any wireless receiving apparatus within a certain distance, and quotes approvingly the suggestion of Admiral Bradford that it may be necessary for the Department in time of war to take possession of all receiving and transmitting stations to prevent interference with the plans of the Government.

Incidentally the Secretary recommends legislation for the relief of artisan employees of the navy who may be injured in the line of duty and who now have no remedy either at common law or under any statute. W. L. C.

### Shenango Valley Notes.

Railroad developments, both steam and electric, continue to hold the center of interest in the Shenango Valley. It seems certain that the Wabash will secure an entrance to New Castle. It is also freely predicted that the same system will reach South Sharon, by way of the valley of the Neshannock, but in the best informed circles little importance is attached to the reports which say it will be extended to Sharon soon. It is pointed out that the several systems now reaching Sharon will be able to handle the traffic of the Sharon and the South Sharon mills for the present, and it is considered very likely that the consolidated Union and Sharon steel interests will build their railway from Pittsburgh to Lake Erie by way of Sharon, thus giving another outlet to the heavy tonnage of the valley.

It is very evident, however, that the capitalists interested in the many iron and steel plants of the Shenango Valley have all faith in the future of this district. The Sharon Steel Company management announced just previous to their entering the consolidation with the Union Steel Company that they had made arrangements to employ and maintain a working capital of \$3,000,000. Their plant has cost about \$14,000,000.

The Pittsburgh & Lake Erie Railroad Company have announced during the past week that they will erect a new passenger terminal in New Castle at a cost of \$100,000.

The West Pittsburgh development, 2 miles south of New Castle, continues to make substantial progress. The West Pittsburgh Water Company will be incor-

porated shortly to supply water to the new town. The directors are Robert and John Garland and F. D. Hodgkinson of Pittsburgh, and John P. Cunningham and William K. Hugus of New Castle. William K. Hugus is the attorney for the Garland Company, who have laid out the new town and are making the largest investments there. The other incorporators are heavily interested in Pittsburgh iron industries.

The coming of the Buffalo, Rochester & Pittsburgh Railroad into New Castle has been attended with an immense expense for right of way and construction. The track has been laid high up along the hillside in a most unlikely looking location, and the company appear to have only made a beginning in their expenditures. For the past year the business of this company in New Castle has been principally the sale and delivery of coal, and they have built up a very large business. They have secured entrance to a good number of the mills, and it is believed that recent real estate purchases indicate the establishment of blast furnaces and a steel mill along the right of way in New Castle.

The competition between the Pennsylvania and Wabash railroads at New Castle promises to be sharp. The Pennsylvania has bought \$150,000 worth of property along the proposed right of way of the Wabash.

The New Castle & Shenango Valley Railroad, extending from New Castle to Sharon, and operated by the Erie Railway Company under a 99 year lease, is soon to be greatly improved, and it is understood that the improvements will be made by the Pittsburgh & Lake Erie Railroad Company, which road will have a traffic arrangement with the Erie Company, permitting the joint use of the track. The road will be double tracked the entire distance between New Castle and Sharon, and a large yard will be built about 2 miles north of New Castle. The track is at present very crooked, and several wrecks have resulted.

**Medina Water Power Development.**—A. L. Sweet, connected with the Sweet Iron Works of Medina, Orleans County, N. Y., has completed plans for an extensive water power development near Medina. Through the various companies of which he is the head, Mr. Sweet controls the Medina Falls dam and wheels, which, under the new project, will be left undisturbed. He also owns the dam and pond of the old Bignall Mfg. Company, located some distance further down the creek, and the Sweet Iron Works dam. Under the new plan all but the Medina Falls dam will be removed. The new project is to build a dam across the gorge from a hill on the west bank to the naturally high eastern bank. This dam will be 540 feet long, 52 feet high and quite thick, the idea being to have a roadway across the top. The dam construction will result in a large reservoir, having an average depth of from 10 to 50 feet of water. Other valleys adjoining will furnish further storage capacity. The amount of power possible of development has not been estimated, but it is believed that outside of the local application of the developed energy, there will be sufficient for electric roads operation to all points from the locality, where several electric lines are now projected.

**British Coal and Iron Ore Statistics.**—The official report recently issued in Great Britain on the mineral output of that country in 1901 shows smaller quantities and lower prices than in 1900. Coal shrank from 225,181,300 gross tons to 219,046,945 tons, and iron ore from 14,028,208 tons to 12,275,198 tons. The quantity of pig iron obtained by smelting the domestic ore diminished from 4,666,942 tons, valued at £19,596,910, in 1900, to 4,091,908 tons, valued at £12,826,622, in 1901. The maximum output of iron ore in Great Britain was attained in 1882, when 18,031,957 tons were produced from the home mines. For the next ten years an annual decline was shown, the lowest point being touched in 1893, when the production was only 11,203,476 tons. The apex of the subsequent improvement was reached in 1899, the output in that year being 14,461,330 tons. The iron ore imported from other countries to be smelted in British furnaces aggregated 5,548,888 tons in 1901, against 6,297,963 tons in 1900.

## The Census Report on Motive Power Appliances.

In his report on motive power appliances to the twelfth census Edward H. Sanborn includes the builders of boilers, engines, turbines, &c., used in the generation of power, but excluding locomotive and motor vehicles which produce power only for their own propulsion. The report states in part:

The 1170 establishments covered by this report produced during the census year 40,533 steam boilers, representing an aggregate of 2,928,983 horse-power, with a total value of \$25,663,445. Of steam engines of all types there were manufactured 29,120, representing 2,210,727 horse-power and valued at \$28,019,971. The number of internal combustion engines, using gas, petroleum or other vapors, produced by these establishments was 18,531, their aggregate horse-power was 164,662 and their total value amounted to \$5,579,398. There were also manufactured 2680 water motors, including overshot and undershot wheels, turbines and impact wheels, with an estimated total of 367,934 horse-power and an aggregate value of \$1,520,849. The totals for all primary powers, exclusive of steam boilers, were as follows: Number of units, 50,331; aggregate horse-power, 2,743,323; total value, \$35,120,218. The other products of these 1170 establishments amounted in value to \$84,754,239; the amounts received for custom work and repairing reached a total of \$26,664,243, and the total output of all products and all classes of work represented a value of \$172,202,145.

The average rated capacity of all the fire tube boilers constructed during the census year was 54 horse-power per unit and the average cost per horse-power was \$9.28. Water tube boilers, as a rule, are of larger steam raising capacity, the average per unit, as shown by these tables, having been 208 horse-power, while the average cost per horse-power was only \$7.73. The 767 marine engines embraced by this tabulation averaged 516 horse-power per unit and the average cost per horse-power was \$17.72.

Of fixed cut off throttling engines the average for 21,806 engines was only 30 horse-power each. The average cost of \$12.11 per horse-power is higher than the cost of any other style of engine because of the smaller size of the units and the lower efficiency of the engine as compared with other types.

The high speed, variable, automatic cut off engines commonly known as automatic high speed engines, the distinguishing characteristic of which is the fly wheel governor, show an average of 82 horse-power each for the 3823 engines embraced by this report, and the average cost per horse-power was \$10.43.

The average of 2724 engines of the Corliss type constructed during the census year was 309 horse-power each, while the average cost per horse-power was \$11.59.

Internal combustion engines, including all those motors which use gas, gasoline, kerosene or any other vaporized fuels, show the smallest average size and the highest average cost per horse-power. The 18,531 engines of this class embraced in this report were of an average of 8.88 horse-power each, while the average cost per horse-power was \$33.88.

Of 58 overshot and undershot water wheels, averaging 21 horse-power each, the cost averaged \$9.74 per horse-power.

The 1635 turbines made during the census year averaged 187 horse-power each, this high average being due to the considerable number of units of large capacity demanded by the great plants that have been constructed for the development of hydraulic power and its electrical conversion and transmission. An average cost of \$3.95 per horse-power is shown for these turbines.

The average of 57 horse-power for the 957 impact wheels has but little significance because of the wide range of the capacity of these motors owing to the varying head of water. The average cost of \$5.01 per horse-power is rendered of little value by the same causes.

### Centers of Production.

The largest number of fire tube boilers was made in Pennsylvania, 9967 being reported for that State, with an aggregate of 477,877 horse-power and a total value of \$4,748,571. New York ranks second, with 3708 boilers, aggregating 171,139 horse-power and valued at \$1,814,997. In value of products Illinois stands third, with 2666 boilers, representing 150,007 horse-power, with a total value of \$1,713,340. Ohio reports more boilers with larger total horse-power, 3562 boilers, 182,903 horse-power, and a value of but \$1,360,843. Three other States each produced more than \$1,000,000 worth of fire tube boilers: Michigan, 3278 boilers of 107,522 total horse-power and a value of \$1,109,527; Indiana, 3046 boilers, representing 161,212 horse-power, with a value of \$1,105,923, and Massachusetts with 1836 boilers, aggregating 145,823 horse-power and valued at \$1,083,179.

The manufacture of water tube boilers, while scattered through a score of States, centers chiefly in Ohio and New Jersey, the prominence of these two States being due to the large output of two well-known types of boilers. In Ohio 1990 water tube boilers were made during the census year, aggregating 469,486 horse-power and \$2,513,881 in value. New Jersey reported 1009 water tube boilers, representing a total of 201,410 horse-power and \$2,350,715 in value.

The prominence of the shipbuilding industry in Pennsylvania gives to that State leadership in the building of marine engines. Although but 90 were built in that State during the census year, their aggregate horse-power amounted to 121,384, or an average of 1348 horse-power for each engine, while their total value was \$3,047,288, an average of \$33,858 each.

Pennsylvania leads also in the manufacture of fixed cut off throttling engines, or plain slide valve engines as they are commonly called. Of this type 7804 were built, with an aggregate of 211,805 horse-power and a total value of \$2,581,499. New York ranks second, with 2604 engines, 111,410 horse-power and a value of \$1,179,423. In these two States only did the product of this type of engine reach a value of \$1,000,000 or more.

The largest number of high-speed, variable, automatic cut off engines was made in Pennsylvania, the figures being 827 engines of 95,633 horse-power and valued at \$1,016,771.

Wisconsin stands far ahead of all other States in the construction of heavy engines, classed for the purposes of this report as low speed, variable, automatic cut off. This State reported 498 engines of this type, aggregating 261,403 horse-power and representing a total value of \$3,547,045. These engines averaged 525 horse-power each and \$7122 in value. This industry centers chiefly in Milwaukee, where there are several large establishments devoted mainly to the building of heavy engines. Ohio ranks next to Wisconsin in the output of engines of this class with 344 engines, an aggregate of 158,787 horse-power and a total value of \$1,464,160. Pennsylvania comes next with 411 engines, aggregating 95,272 horse-power and representing a total value of \$1,125,559. The Pennsylvania engines averaged only 232 horse-power each, as compared with an average of 461 horse-power for the Ohio output.

Pennsylvania showed the largest product of gas engines, considering power and value. The number was 2548, their aggregate horse-power was 45,102, and their total value amounted to \$1,157,910. Wisconsin reported the largest number, 4670, but they represented only 27,192 horse-power, with a total value of \$940,352. Ohio stands third, with 2001 engines, aggregating 28,717 horse-power, and having a total value of \$808,491.

The largest number of turbine water wheels was made in Ohio, 742 wheels, with an estimated aggregate of 140,233 horse-power, and a total value of \$726,902.

California produced most of the impact wheels, the output being 369 wheels, valued at \$243,450, with a nominal rating of 53,395 horse-power.

### Boilers.

In the generation of steam no radically new principles have been developed during the last decade. Steam boilers have been improved in structural details and in

design, and the steady tendency toward higher steam pressures has necessitated more rigid specifications for the materials used in their construction.

Water tube boilers have grown in favor because of their demonstrated efficiency, and many new types of this class of generators have been brought out. The vertical tube style has come into wider use than in previous years, particularly in the large installations of blast furnaces and steel works.

Several forms of superheaters, both as attachments to the boilers themselves and also for independent installation, have come into use in late years, but their application has been limited and the economies of superheated steam have received much less attention in the United States than in Europe.

The use of mechanical stokers has increased largely. Municipal ordinances compelling smokeless fires have exerted considerable influence in inducing the larger use of automatic stoking devices. Several new types of mechanical stokers have been developed, the underfeed being one of the new principles that has been embodied in several types.

As one incident of the more economical generation of steam, which has been conspicuous in recent years, the larger use of economizers to utilize the heat of escaping products of combustion for raising the temperature of feed water is worthy of mention, and the use of mechanically induced or forced draft is another phase of the same general tendency toward greater economy.

The large number of steam plants of great capacity which have been constructed in recent years in connection with central electric lighting stations, street railway power houses and large industrial plants, has tended toward the introduction of many economies for which there is neither necessity nor opportunity in small steam installations. The enormous quantity of coal and ashes to be handled in large steam plants permits the use of mechanical conveyors with marked saving in the expenditure for hand labor. In this and many other ways, the arrangement and operation of large power plants has been reduced to a far more economical basis than ever before attempted, and careful study is now given to small details which formerly were considered of little consequence. All of this is the result of the constantly increasing magnitude of industrial operations and the prominence which is thus given to details formerly overlooked in small undertakings.

#### Steam Engines.

The reciprocating steam engine had so nearly fulfilled its possibilities in 1890 that comparatively little advance has been made during the last decade, except in the direction of increased size and importance of the units.

In one instance—at the central station of the Manhattan Elevated Railroad, in New York City—the low pressure cylinders, with the large and heavy pistons, are placed vertically, thus avoiding the necessity of carrying the weight upon the cylinder surfaces, while the high-pressure cylinders are placed horizontally and their pistons are connected with the same crank pin. This is the most powerful unit designed for stationary practice up to 1900, and consists of two compound engines operating upon the same shaft, with the cranks set at 135 degrees. The cylinders are 44 and 88 inches in diameter, with a stroke of 5 feet, designed to be run at 75 revolutions per minute. The rated capacity is 8000 horse-power at one-sixth cut off in the high pressure cylinder, with 150 pounds initial pressure and a vacuum of 26 inches, and the engine can develop 12,000 horse-power when required.

As an additional illustration of the tendency toward larger units, the engines of the New York Edison Company are worthy of mention. These are of the vertical type, with one high pressure cylinder 43½ inches in diameter and two low pressure cylinders 75½ inches in diameter. The stroke is 60 inches and the speed is 75 revolutions per minute. With a steam pressure of 175 pounds and a vacuum of 26 inches these engines are rated at 6000 horse-power, but are capable of developing 10,500 horse-power. The low pressure cylinders are steam jacketed and the steam is superheated 200 degrees.

During the past ten years there has been a tendency in the direction of increased steam pressures. No higher pressures are now used than existed in 1890, but, whereas at the commencement of the decade 120 pounds was an uncommon and 150 pounds an exceptionally high pressure, the lower pressure is now commonly used and most of the large plants are designed for 150 pounds. In many instances much higher pressures are used.

In 1890 compounding had made considerable progress and since then the compound engine has become popularized. All the builders have adopted it, and even the small self-contained units are bought in this form where there is any pretension to steam efficiency. In the last few years, however, there has been a marked reaction against the tendency to run a multiplicity of cylinders which obtained earlier in the decade, and it is now very rarely that the expansion is divided into more than two stages for stationary engines on any other than pumping engine work. In some two-stage compound engines the low pressure cylinder is made so large, as compared with the high, that the engine is virtually three-stage, or triple expansion, with the intermediate cylinder removed, and the efficiencies attained appear to be so nearly those of the triple expansion engine as not to warrant the extra expense and complication of the third cylinder.

Little has been done to determine the real effect of the steam jacket upon ultimate efficiency. Leading engineers differ as to its value and desirability, and as to the manner of its use when it is adopted—i. e., whether the jacket should not be applied to all the cylinders of a compound, and if not, upon which it should be used. In Europe the general practice is to supply the cylinder with steam through the jacket; in the United States the jacket supply is usually separate.

#### The Steam Turbine.

The efficiency of the steam turbine varies according to conditions, just as the economy of the reciprocating engine is similarly affected. It has been demonstrated by repeated tests that a steam turbine of, say, 300 horse-power will run at full load on a consumption of 14 pounds of steam per horse-power, and it is claimed that this can be reduced under favorable conditions in larger units to about 11 pounds. It has been abundantly shown in regular service that the steam turbine equals the best efficiency of the reciprocating engine under similar conditions.

There is an obvious advantage in economy of space as compared with the reciprocating engine.

Friction is reduced to a minimum in the steam turbine, owing to the absence of sliding parts and the small number of bearings. In one type there are practically but two bearings. The absence of internal lubrication is also an important consideration, especially when it is desired to use condensers.

As there are no reciprocating parts in a steam turbine, and as a perfect balance of its rotating parts is absolutely essential to its successful operation, vibration is reduced to such a small element that the simplest foundations will suffice, and it is safe to locate steam turbines on upper floors of a factory if this be desirable or necessary.

The perfect balance of the moving parts and the extreme simplicity of construction tend to minimize the wear and increase the life of a turbine and at the same time to reduce the chance of interruption in its operation through derangement or damage of any of its essential parts.

Although hardly beyond the stage of its first advent in the motive power field, the steam turbine has met with much favor, and there is promise of its wide use for the purpose to which it is particularly adapted. At present, however, its uses are restricted to service that is continuous and regular, its particular adaptability being for the driving of electrical generators, pumps, ventilating fans and similar work, especially where starting under load is not essential.

Steam turbines are now being built in the United States in all sizes up to 3000 horse-power. Their use abroad covers a longer period and has become more general. The largest turbines thus far attempted are those

for the Metropolitan District Electric Traction Company of London, embracing four units of 10,000 horse-power each. Several turbines of large size have been operated successfully in Germany.

The attention that is now centered on the steam turbine promises the development of some new ideas and the evolution of a still more efficient form of motor; and it is fair to expect a rapid multiplication of types embodying the general principle now in use.

#### Internal Combustion Engines.

The large increase in the use of internal combustion engines, the multiplication of types, the marked improvements in their construction and efficiency and the application of their principles in units of great size together form one of the interesting phases of the problem of economical power generation as it has developed during the past ten years. The gas engine, using ordinary illuminating gas, igniting either by a hot tube or an exposed flame, practically represented the internal combustion motor as it was known ten years ago, but since that time there has been progress, perhaps more marked than in any other form of heat engine. Internal combustion engines now are constructed for operation with illuminating, natural or producer gas, or with gasoline, kerosene or alcohol. The electric spark has largely taken the place of the hot tube or exposed flame for ignition of the explosive gaseous mixture in the cylinder. The increase in the size of the units is well illustrated by the fact that in the World's Columbian Exposition in Chicago in 1893 the largest gas engine exhibited was one of 35 horse-power, while at the Paris Exposition in 1900 a single cylinder engine capable of developing 1000 horse-power with ordinary illuminating gas was shown.

The recent extraordinary growth of the motor vehicle industry, both in the United States and abroad, has stimulated the development of small internal combustion motors of from 3 to 40 horse-power, compact in construction and economical in their operation. Along quite similar lines the use of gasoline engines for the propulsion of small boats, and even for yachts of moderate size, has given great impetus to this industry and has stimulated improvement. As illustrating the extent to which this application of the internal combustion motor has been carried, it may be noted that a gasoline engine which developed 190 brake horse-power was used for the propulsion of a Holland submarine torpedo boat, while a 133 horse-power gasoline engine has been substituted for steam power in a yacht 92 feet long and 16 feet beam.

Probably the best demonstration of the economy of the internal combustion motor as compared with the steam engine is afforded by the use of the gas engine in connection with gas producers. It has been shown that such a combination will utilize about twice as much of the energy of the fuel as can be developed by the use of the steam boiler and engine.

The most notable phase of gas engine development is the utilization of the waste gases from blast furnaces for the operation of large engines, either for furnishing air blast for the furnaces themselves or for the operation of adjacent rolling mills. The driving of blowing engines by gas from the furnaces which they feed has the semblance of a paradox, but it has been successfully accomplished in Germany, Belgium and Great Britain, and a large blast furnace plant now under construction in the United States is being equipped on this plan.

It is calculated by Bryan Donkin that about 400 cubic feet of blast furnace gas must be burned under a boiler to produce 1 horse-power per hour at the engine, while about 105 to 110 cubic feet will develop the same power when exploded in an internal combustion engine cylinder. Thus the economy is as 4 to 1—that is to say, for every horse-power developed in a steam boiler and engine 4 horse-power could be generated in a gas engine with the same quantity of fuel.

#### Water Motors.

The great increase in the utilization of water powers during the past decade has stimulated the development of the turbine water wheel and has led to many improvements in construction and to some increase in

efficiency. It has come to be the general practice among manufacturers of turbines to construct wheels with special reference to the particular conditions under which each turbine is to be used rather than to make certain standard sizes without regard to the service that is required in each instance. This has resulted in a very careful study of not only the generation of the power, but its most economical transmission to the machinery which it is intended to drive.

It is a common practice at the present time to use a draft tube for carrying away the tail water, thus making it possible to place the turbine above the higher level of the water in the tail race, where all connections are readily accessible under all conditions. As the suction of the water that has passed the turbine and is flowing through the draft tube is practically equal to the pressure that the same flow of water would exert above the turbine, there is practically no loss in efficiency in the use of a draft tube of proper construction, while very decided advantage is derived from the placing of the wheel and its shaft and bearings and all connections where they can be examined without difficulty at all times.

The increased use of turbines for driving electrical generators, with the desirability of a direct connection without any intervening gearing or belting, has also tended to the larger use of the horizontal type of wheels. The coupling of two horizontal turbines with a single central discharge tube has facilitated the use of larger units, and where still greater power is desired two or more such units are coupled together to drive a common shaft.

One notable advance in turbine construction has been the production of a type of wheel especially designed for operating under much higher heads of water than were formerly considered feasible for wheels of this type. Turbines are now built for heads ranging from 100 to 1200 feet, and quite a number of wheels are in operation under heads of from 100 to 200 feet.

In contrast to the prevailing tendency toward the use of horizontal wheels is the great installation of vertical turbines at Niagara Falls, which bids fair to be for many years the most notable hydraulic installation in the world. Here units of 5000 horse-power each are operated under a head of 150 feet; but the water being admitted from beneath, the vast weight of the wheel shaft and the dynamo on its upper end is sustained by the water pressure, thus reducing the element of friction to a nominal point.

The extensive use of turbine water wheels directly connected to electrical generators has necessitated the development of sensitive governors to regulate the supply of water to the varying loads upon the dynamo. Several types of turbine governors entirely automatic in their action have been perfected, and it is now possible to secure regulation practically as sensitive and efficient as the government of the best steam engine. The improvement of the turbines themselves has contributed to this result, in addition to the accuracy and sensitiveness of the governors.

The impact water wheel has come largely into use during the last ten years, principally in the far West, where higher heads of water are available than can be found in other parts of the country. With wheels of this type, exceedingly simple in construction and of comparatively small cost, a large amount of power is developed with great economy under the great heads that are available. With the tremendous water pressure developed by heads of 1000 feet and upward, which in many cases are used for this purpose, wheels of small diameter develop an extraordinary amount of power. To the original type of impact wheel which first led the field have been added several styles embodying practically the same principle. Considerable study has been given to the designing of buckets with a view to securing free discharge and the avoidance of any disturbing eddies, and important improvements have resulted from the thorough investigation of the action of the water during and subsequent to its impact upon the buckets.

## The Early History of the Corliss Engine in the United States.\*

BY GEORGE R. PHILLIPS.

I have always reckoned it as one of the pieces of good fortune that has come to me in my life to be connected in business relations with a man like Mr. Corliss. In the 14 years that I was in his employ as mechanical draftsman I came to know him well and to learn something of the history of the engine which for the past 50 years has made his name a household word among the builders and users of the steam engine.

George Henry Corliss was born July 2, 1817, at Easton, Washington County, N. Y. He died at Providence, R. I., February 21, 1888. He was a country boy, the son of a physician, and did not have the advantages of a college or technical education. I have heard him tell of his attempts to master some of the elements of algebra while watching with a gun before a woodchuck's hole. In the nature of things he probably secured more woodchuck than he did knowledge of algebra. He showed no marked evidence in his early years of the inventive genius which developed later, and up to the time he was 22 years of age had never seen the inside of a machine shop. His first experience in business was as a clerk in a country store, and at the age of 21 he opened a store of his own. He soon tired of the monotony and the limited scope of his business and sold out his stock. Then it was that his mind turned to mechanics.

### Corliss' First Invention.

His first mechanical invention was a sewing machine for sewing leather, an invention which he always claimed antedated Elias Howe's. It was to perfect this machine and to get it built that he came to Providence, R. I., in the year 1844, applying to the firm of Fairbanks, Bancroft & Co., then doing a machine and engine business near India Point, in that city. The firm were not long in discovering that Mr. Corliss, then about 27 years of age, was such a young man as they wanted in their employ, and they prevailed on him to drop for the time the sewing machine and give his attention to other and more important projects on which they were at that time engaged. So valuable did he make himself that within a year he was admitted to the firm, and it was about this time (1846) that he conceived the improvements which have revolutionized the steam engine business and given him a lasting fame.

### Corliss as an Engine Builder.

Soon after this Mr. Corliss associated himself with John Barstow and Edwin T. Nightingale, under the firm name of Corliss, Nightingale & Co., and the first engine embodying Mr. Corliss' improvements was built by this firm. His first patent was dated March 10, 1849, and was for a term of 14 years. This original patent was reissued in 1851, and again reissued under date of July 12, 1859, this time divided into six new patents, numbered 758, 759, 760, 761, 762, 763. Each of these reissued patents was for a distinct and separate part of the improvement originally patented. No. 758 was for the wrist plate, No. 759 for the liberation of slide valves, No. 760 for the air cushion, No. 761 for the positive closing, No. 762 for the helical cam and No. 763 for the combination of the regulator with the cut off. The claims in these patents were drawn with great skill and are models in their way. Their strength is in their brevity. Note the perfect description of slide valves in patent No. 759, wherein is claimed: "The combination of a liberating valve gear with valves which are moved parallel to their seats, and continue their closing motion after their ports are closed and commence their opening motion before their ports open." Note also the brevity and breadth of claim in No. 763: "The method is substantially as described of regulating the velocity of steam engines by combining a regulator with a liberating valve gear."

The first engine built by the new firm was finished and put in practical operation as early as February,

1848 (over a year previous to the issue of Mr. Corliss' original patent). It was an engine of 260 horse-power, and was installed in the works of the Providence Dyeing, Bleaching & Calendaring Company on Sabin street, in the city of Providence. During 1848, or early in 1849, Mr. Corliss had completed and put in operation two other engines of about the same size. These engines were so successful that the firm were emboldened to purchase land in the north part of the city of Providence and erect extensive works. These works were ready for occupancy and the business was removed to them during the year 1849. April 30, 1850, Mr. Barstow withdrew from the firm, and the firm name became Corliss & Nightingale. On August 1, 1857, the Corliss Steam Engine Company were organized and chartered, the stockholders being Mr. Corliss, Mr. Nightingale, John H. Clark, Scott A. Smith and Granville Wood.

### Litigation.

Notwithstanding the success attending the operation of the new engines, it was not altogether smooth sailing for the new machine, for the early years of its manufacture were marked by constant and bitter litigation. Indeed, I have heard Mr. Corliss say that for 15 years he did not know whether he was worth a dollar or not. As early as June, 1849, even before the new works were in operation formal notice was received by the firm of Corliss, Nightingale & Co. from Gen. Charles T. James announcing his intention to commence legal proceedings to prevent the manufacture and use of engines containing Mr. Corliss' improvements, on the ground that they were infringements of the patents of Fred'k E. Sickels. General James was a man of influence among New England manufacturers, and held an interest in or owned entire the Sickels patents. The threats of legal proceedings, not only against the firm of Corliss, Nightingale & Co., but against any persons using engines containing Mr. Corliss' invention, greatly embarrassed the new firm and proved a serious obstacle to the extension of their business, a fact which in after years, when his patent had expired, Mr. Corliss used as an argument in favor of its extension, which extension was granted. It was in 1850, the year following Mr. Corliss' original patent, that General James purchased an interest in the patents of Fred'k E. Sickels, one dated May 20, 1842, and the other September 19, 1845. On May 20, 1850, James brought suit against Corliss, Nightingale & Co. for infringement of the Sickels patents of 1845. This was the first of a series of suits offensive and defensive, extending over a term of some 15 years. During this time General James assigned his interest in the Sickels patents to the firm of Thurston, Greene & Co. of Providence, R. I., and they took up the fight, suing parties using engines with Corliss' improvements; Mr. Corliss in every case defending his customers; and he also sued parties using engines built by Thurston & Greene, and so the war went on.

Some of the trials were before juries, and it was curious to note the results in these suits. Nearly all the jury trials resulted in disagreements, though in most cases the great majority of the jurymen were favorable to Mr. Corliss. When a jury did agree the verdict was generally a wrong one, as subsequent decisions proved. Cases tried before judges almost always resulted in Mr. Corliss' favor. It shows how difficult it is to bring 12 men to be of one mind when questions of mechanics and nice points of law are involved, and it also shows that in such cases one good clear headed judge is worth more than many juries. The litigation, carried on with much bitterness for year, finally resulted in Mr. Corliss' patents being fully sustained on all points, and thenceforward until their expiration in 1870 he had the field to himself. There can be no doubt that the various decisions of the courts sustaining Mr. Corliss' patents were just decisions. No one can read the wonderfully able argument of William H. Seward before Judge Nelson in the suit for injunction brought by Sickels against Corliss and not be convinced of this. He covers the ground in the most thorough and masterly manner. And yet one can hardly fail to feel a certain sympathy for a man who, like Sickels, came so near achieving a great success and yet missed it.

\* A paper read before the Engine Builders' Association of the United States, New York, December 1, 1902.

### Sickels' Inventions.

Like others reared in a certain line of work, he failed to take in the full possibilities of the subject. He was a marine engineer, at least he was reared in a marine engine atmosphere, and looked at things accordingly. His patent antedated Corliss', and had he taken a broader view of the subject, and drawn his claims as in the light of after events he doubtless would have drawn them, he would have made Mr. Corliss' road a more difficult one than it was. Mr. Corliss, fresh from the country, untrammelled by any early mechanical training, took a broad and comprehensive view of the situation, saw the possibilities and reaped success, illustrating the fact that a fresh mind, unbound by traditions, running in no rut, and tied to no theory or methods, will often see a subject at a glance more clearly, more comprehensively than one that has worked and schemed on it for years. Sickels invented an improved method of lifting, tripping and cushioning puppet valves. He mentioned no other kind of valve in his patent. He evidently had no other valve in mind, or if he had, thought the puppet valve the only good one and the only one worth considering. Corliss invented an improved method of operating, tripping and cushioning slide valves. His patent mentions no other. In fact, his claims are so drawn as to exclude all others. Sickels devised a water dash pot to cushion the valve to prevent its slamming on its seat. Corliss devised an air cushion to prevent the slamming of the weight that closed the valve. In Sickels' case the valve was lifted and dropped onto its seat. In Corliss' case the valve did not leave its seat. With Sickels' it was necessary to bring the valve to rest in an extremely short distance. With Corliss' it mattered little when the motion of the valve was arrested. It passed over the port and closed it while still moving at full speed. Then its main work was done, and whether it stopped a little sooner or a little later after that it mattered not.

Mr. Seward concisely described Mr. Corliss' invention in the following words: "To sum up the matter, the regulation of the engine is made perfect by the peculiar way of combining the governor with the cut off, and the cut off is made perfect by the automatic adjustability secured by that connection."

In the prolonged legal fight which took place lawyers of the highest ability were employed on both sides. Among Mr. Corliss' lawyers were B. R. Curtiss, William H. Seward (afterward Secretary of State under Lincoln), E. W. Stoughton, Samuel Batchford of New York, ex-Governor Baldwin of Connecticut and Hon. Samuel Ames and Thomas A. Jenckes of Rhode Island.

I have mentioned the able argument of Mr. Seward before Judge Nelson. To read this argument is to be filled with admiration for the mind which, though untrained in mechanics, could so grasp and completely master the subject of the steam engine in all its details as Mr. Seward did in this famous case. I have heard Mr. Corliss relate the difficulty he had in getting his lawyers to thoroughly comprehend things as he did, to see things as he saw them. And it was on this very case before Judge Nelson that, after trying with indifferent success to get them to "see the point," Mr. Seward came to his room at the hotel one evening and said "Corliss, I think I have it. I think I see the thing now as you do." And he proceeded then and there to expound the case in so clear and forceful a manner as to arouse the keenest admiration on the part of Mr. Corliss.

### Early Results.

To secure business and the introduction of his engine Mr. Corliss in the early days resorted to the making of unusual guarantees, often agreeing to take as the price of the engine the saving of fuel in a specified time. In 1855 he put an engine and boilers into the James Steam Mill, at Newburyport, Mass., the price for engine and boilers to be five times the amount of coal saved in one year. The old engines, which were 24 x 48 (condensing, developing about 180 horse-power), used on an average of five years preceding Mr. Corliss' contract 10,483 pounds of coal per day and were fair examples of the engines in use before Mr. Corliss' time. The new engines were found to use but 5690 pounds

per day, making a saving in a single year of \$3946.84, coal being reckoned at \$6 per ton, making the total price paid to Corliss & Nightingale for a 180 horse-power condensing engine and boilers \$19,734.22. I fancy some of our engine builders of to-day would like to receive as good prices as that. These same engines in 1857, during a week's test, used for all purposes 4900 pounds of coal per day of 11 hours while developing 180 horse-power, which is equal to less than 2½ pounds of coal per hour for each horse-power.

In 1856 a new engine was put into the Ocean Steam Mills in Newburyport, Mass., Mr. Corliss agreeing to take the old engines (which previous to this were considered by the owners first-class machines) and the saving of fuel in two and one-half years, or the sum of \$3000 cash. The mill company decided (having doubtless in mind the experience of their neighbor, the James Steam Mill) to pay the \$3000, a wise decision, as the saving amounted to that in two years.

The Bartlett Steam Mill was another Newburyport mill to put in Corliss engines at about this time, he making the same proposal as that to the James Steam Mill, the price of the new engines to be the saving of coal in five years. Afterward they solicited him to make them a market price for the engines and give them the option between paying the price or the saving in coal, their decision, however, to be made before the engines were operated. After some hesitation, and in view of the fact that no mill in the country except those equipped with Corliss engines were doing so well as theirs, they decided to pay the price. The result of two years' running showed that they made a handsome saving by settling in that way. The treasurer of the mill in a letter to the Corliss Steam Engine Company, from which letter I glean these facts, also makes this interesting statement. "We are obtaining 50 per cent. more work from each pound of coal consumed than we did with our former engines."

Three engines, one in each mill, were put into the three cotton duck mills of H. N. Gambrill & Co., Baltimore, Md., with the following handsome results: In the Woodbury Mill the coal was reduced from 3½ tons per day with the old engines to 2 tons per day with the new; in the Clipper Mill from 3½ to 2¼ tons per day and in the Washington Mill from 4½ to 3¼ tons per day. With the old engines they used the best Cumberland coal, costing \$5.50 per ton; with the new engines they used anthracite chestnut coal, costing \$3.50 per ton, so that the cost of the fuel for the three mills, which with the old engines was \$63.25 per day, was reduced with the new engines to \$26.26, a saving of 58 per cent. No wonder that Mr. Gambrill, in writing to the Corliss Steam Engine Company in making the above statement, said that "it would be superfluous for him to attempt any words of commendation of the engines in view of the facts and figures."

In 1852 a new engine was put into the rolling mill of Crocker Brothers & Co., in Taunton, Mass., guaranteeing to do one-third more work than the old engine was doing, and when 5 tons of coal were used per day but 2 tons should be used to do the same work; forfeit \$1 per pound for every pound per day used above that amount. Another contract which sounds hazardous, but which shows the faith which Corliss and his partners had in the engine, was that made with the Washington Mills, at Gloucester, N. J., wherein they agreed to put in an engine of about 200 horse-power for the sum of \$7100 and to forfeit \$5000 for each ton per day of coal above 4 tons which should be used in driving the mill. This contract was entered into knowing that about 9 tons per day were used with the old engines.

### Regularity of Speed.

Another guarantee made when occasion called for it was regularity of speed, and this merit in the engine was of almost as much value as the saving of fuel. The more perfect regulation obtained made the engines especially desirable in cotton mills, where extreme regularity of speed is of the utmost importance. It gave not only a more perfect product, but very materially increased the quantity of goods as well, the increase amounting to from 5 to 10 per cent. Manufacturers

compelled to run their business on close margins can appreciate what an advantage this was. The spinning machines of a cotton mill run with great rapidity, about 8000 turns per minute being common for ring spinning frame spindles. It can readily be seen how a very slight variation in the speed of the engines, many times multiplied by the time the motion reaches the fast running spindle, may prove seriously destructive. In the old fashioned engines, those regulated by a throttle valve, the normal or average speed of the engine had to be fixed at a rate low enough so that the maximum speed would not drive the spindles at a speed beyond that intended, which if it did resulted in bad work. On the other hand, too slow a speed resulted in diminished production. It is plain what an advantage the mills which were equipped with Corliss engines had over their less fortunate competitors.

#### Releasing Gears.

Various types of releasing gear were in their turn used by Mr. Corliss on his engines, the first used being what was then called the "incline gear." Then came the "crab claw." With both of these gears, weights were used to close the valves. Then came the "spring lever" gear, with the valves closed by springs. The spring lever gear was short lived, owing to the trouble given by the breaking of the springs. It was a well designed gear, however, and it would seem that the trouble with the springs could have been surmounted. For a time a return was made to the crab claw, which was a good gear when rightly made and a favorite with engineers. Then a few engines were built with a fearful and wonderful arrangement of coiled springs for closing the valves, and at last came the vacuum pot, which has survived to this day.

#### The Corliss Frame

The first horizontal engines were made with what were called "box beds." They were nothing more than long hollow boxes, on which were bolted the cylinders, slides and pillow blocks. Later the "Corliss" frame, so called was evolved. This frame was a model of good design, and much admired for its graceful lines and good proportions. It was at first unsupported throughout its length, but as steam pressure increased with time, and speed grew greater, columns, brackets and feet were added until the old frame was well nigh buried from sight.

The steam pressures common in the early days of the Corliss engine were from 60 to 75 pounds. The piston speed was about 300 to 400 feet per minute.

The first Corliss engines were made with four flat slide valves, operated by the wrist plate and rotating stems, just as the four circular valves were afterward operated. The circular valves, indeed, are in effect but four flat slides rolled up into circular form. There was no patent on the four-valve cylinder, and the credit of originating it has been claimed by others than Corliss. The veteran, William Wright, of Newburgh, who was at one time foreman of the Corliss shop, was one who claimed it, and he once showed me a faded and worn pencil sketch, which he made at the Corliss works, and which he claimed gave Mr. Corliss the idea.

On the expiration of Mr. Corliss' patents, at the end of their first extension in 1870, he applied for another extension, on the ground that he had not received the remuneration that so important an invention should have given, but the extension was denied, the invention becoming public property, and a number of firms throughout the country began to build Corliss engines.

A few shops had been licensed by Mr. Corliss during the life of the patent to build his engines, but comparatively few were built outside of his works. The license fee charged by Mr. Corliss not only to outside builders, but to the firm in which he was a partner, was \$2 per square inch area of piston for cylinders of less than 24 inches diameter and \$1.50 per square inch area of piston for cylinders 24 inches diameter and upward. This resulted quite naturally in the building of engines of large diameters and short strokes, and it is interesting to note that after the expiration of the patent there was a marked increase in the length of the

strokes with a corresponding decrease in the diameter of the pistons produced at the Corliss works.

While the building of Corliss engines has been taken up by a large number of firms, and extensive works have grown up in various parts of the country, the old Corliss works in Providence, present the same outward appearance to-day that they did 20 years ago. No new buildings, no extensions, no visible evidence of the wonderful expansion which has marked the steam engine business in other cities. To one who grew up in the old shop and has always taken a lively interest in its welfare it is pitiful; and the reflection forces itself on one that if the broad gauged practical man who went out from it 25 years ago to build engines in Milwaukee had remained to direct its affairs the greatest steam engine works in this country, if not in the world, would not have been as they are on the shores of Lake Michigan, but in the city of Providence.

Mr. Corliss took some steps to adapt his invention to the locomotive and built several marine engines, but success in these directions was but partial, and it is as a mill engine that the engine bearing his name has done its really effective work.

#### Corliss as a Pump Builder.

Of pumping engines Mr. Corliss built but five. The first was for the city of Providence and was erected at the Hope Pumping Station on Olney street in the year 1873. It was of unique design, having five horizontal steam cylinders and five horizontal double acting pumps, evenly spaced around one central vertical shaft. This shaft had one crank, on the pin of which was carried a plate extended to form the connecting rod for one of the steam cylinders, and having fastened in it nine pins, which served as the crank piece for the four other steam cylinders and the five pumps. There was thus no dead center, no fly wheel required and no limit to the slow speed which the machine could run. I have seen it run as slow as one revolution in five minutes. Though as a curiosity and in some ways an effective machine, it was a failure as far as the economical use of steam was concerned, giving a duty of but 25,000,000 foot pounds at contract speed, 25 revolutions per minute. The surface condensation and re-evaporation in the steam cylinders (they were not jacketed) was something excessive. Before the tests of the engine were completed Mr. Corliss, realizing the mistake he had made, proceeded to build an experimental engine, which he placed in a special building erected on the Corliss Steam Engine Company's grounds. The building still stands, but the pump was long since broken up. This engine had a single steam cylinder, ran at high speed and was geared to drive ten horizontal single acting pumps. The friction in this machine was excessive, and while the results attained were much better than at Hope Station, they were not satisfactory, and Mr. Corliss proceeded to build another experimental machine, his third pump. This pump was erected in the basement of the North shop of the Corliss works in the year 1875 and was the first compound engine Mr. Corliss ever built. The steam cylinder of this engine was the first steam jacketed cylinder that he ever made. This engine was a horizontal quarter crank compound and was a long step in advance over the previous engines and gave very satisfactory results.

The fact may not be without interest that the tests of the machines were made by N. G. Herreshoff, the famous yacht designer, who was then in Mr. Corliss' employ as mechanical engineer. Mr. Herreshoff had recently returned from Europe, where he had seen many compound engines running, and it was due largely to his urgent advice that Mr. Corliss made this compound engine. This pump was afterward sold to the Lehigh Valley Water Company of Easton, Pa., and is, I think, still running there. The next and fourth pump of Mr. Corliss' was for the town of Pawtucket, R. I., and was a still further advance over the previous one, and gave on its official test the unprecedented duty of 130,000,000 foot pounds. The fifth and last pumping engine was

built by Mr. Corliss in 1879, and is now running at Pettaconsett Pumping Station, Providence, R. I.

#### The Centennial Engine.

In 1876 Mr. Corliss built the famous Centennial engine, a pair of 40 x 10 foot condensing engines which stood in the center of Machinery Hall at Philadelphia and drove the machinery in the building. They were vertical beam engines, designed for 1400 horse-power, though, as a matter of fact, they were not called on to do more than 400. They were looked upon in those days as large machines, but they would seem small in comparison with many of the engines of to-day. They were sold some time after the Philadelphia Exhibition to the Pullman Car Company and are now, or were recently, driving some of the shops at Pullman, Ill.

For a half century the Corliss engine has held its place at the head. Many and various and some fearful and wonderful attempts have been made to produce an engine to supersede it, but without success. Through all it has maintained its proud position as the standard mill engine. How long will it continue to do so? Commercial and social conditions are being rapidly changed. One cannot look back over the 40 years just past and not be impressed with the revolutions which have taken place in all departments of life. We have seen in our day and generation the development of many wonderful things—things that would have brought our ancestors of not so very long ago to the stake as sorcerers and tools of the evil one. We could not have selected 50 better years in which to live—years richer in real progress than those just passed. And the world still moves. What the next 50 years have in store for us, who can tell? Has the long sought rotary engine come at last in the steam turbine, and are the days of the reciprocating engine numbered? It may be; but those of us who have seen so many attempts come to naught will be slow to believe that even this latest rival will succeed in displacing it.

#### Two New Fall River Steamboats.

The contract for building two new steel steamers of the most modern type and perfect equipment for the Fall River Line's Long Island Sound traffic has been awarded to the Fore River Ship & Engine Company of Quincy, Mass. One boat is for the passenger service, and will cost about \$1,000,000 to build; the other is a \$450,000 freighter. The lines and arrangement of the passenger steamer are patterned, in a general way, after those of the "Puritan" of the present fleet, while the freighter is to resemble the "City of Taunton" to a similar degree. It is announced, however, that both boats are to surpass anything of the their kind afloat in construction, finish and speed. The new passenger steamer will be a side wheeler with paddle boxes built into the superstructure. She will be 397 feet long over all and 378 feet 6 inches long on the water line, with 50 feet of molded beam and 21 feet of molded depth, and will measure 88 feet in breadth over the guards at the widest part. She will have a double hull to the water line, bracket plated on the longitudinal system, and divided by water tight bulkheads into 13 compartments. Above the double bottom, which is 3 feet deep at the center, the hull will be divided into seven water tight compartments, with a collision bulkhead, and with a water tight collision steel deck, 11 feet below the main deck, running from the stem aft to the third compartment. The two inclined, compound engines of 5500 horse-power, and the Scotch boilers are to be set in steel inclosure rising above the main deck, and covered with a steel deck. There will be steam steering gear operated from an insulated pilot house.

The general construction of the freighter, which is to be a twin-screw steamer, will be like that of the passenger boat. Her dimensions are: Length over all, 318 feet; length on water line, 291 feet 3 inches; molded beam, 60 feet 6 inches; molded depth, 22 feet 6 inches. She will have two vertical triple expansion engines giving 4500 horse-power, and will be equipped with steam steering

gear, an electric lighting plant, and double freight elevators for forward and after hatches.

The entire construction and fitting up of both vessels—except for upholstery, furniture, &c.—will be done at the Fore River yard. This is rather a departure for the Fall River liners, which have previously been built under separate contracts for hulls, engines and joiner work.

**The New Freights on Iron and Steel.**—The advance of the commodity list of iron and steel articles, which takes in nearly everything in iron and steel shipped in carloads and less than carloads, is being adjusted for an advance of 2½ cents per 100 pounds on the Chicago-New York haul. In other words, the Chicago-New York rate is to be advanced from 25 cents to 27½ cents in carloads. The Pittsburgh-New York rate will be advanced from 13 cents to 14½ cents and the Pittsburgh-Chicago rate from 15 cents to 16½ cents. On pig iron freight rates will be advanced from \$2.20 to \$2.40, in gross tons, Pittsburgh to New York. Billet rates will be advanced from \$2.40 to \$2.60, Pittsburgh to New York. A corresponding advance will be made on the rates between Pittsburgh and Chicago. The new freight rates, which will carry a general advance of about 10 per cent. and become effective on January 1, are now being checked up by the different freight committees and the new tariffs will be ready in a short time.

**A New Steel Hollow Axle.**—The Pressed Steel Car Company of Pittsburgh are fitting up an experimental car with a new design of hollow axle made by the Howard Axle Company, at West Homestead, and which is controlled by the Carnegie Steel Company. The axle is made under the Mercader patent and it is claimed for it a greater efficiency, less weight and one-fifth the machinery necessary in preparing the solid axle. The experimental car is to be put in the local trade of the Pittsburgh district and after being in use six months will be examined to ascertain the wear on the hollow axle. A car fitted with solid axles will be put in the same service and a comparison made of the efficiency of the two cars in the same traffic and equal burden.

The Cuba Railway Company on November 24 opened their new line, which extends from Santa Clara through the center of the western portion of the island of Cuba and on to Santiago. The length of the line is a little more than 450 miles and enables through sleeping cars to run between Havana and Santiago, the trip requiring 24 hours, as against three to four days by steamer. The line is of standard gauge and well built. The company is of an American-British character, headed by Sir William Van Horne as president and a directorate consisting of W. C. Whitney, Thomas F. Ryan, E. J. Berwind, W. L. Elkins, Gen. Grenville M. Dodge, Gen. Samuel Thomas, George C. Haven, P. A. B. Widener, H. Y. Walters and Harry L. Terry.

The organized structural iron workers all over the country have started a concerted movement for more pay after the present scale has expired. The Pittsburgh men will ask for 50 cents an hour. They are now getting 47½ cents. Less than two years ago they received but 34 cents an hour. The men in New York and Philadelphia will ask for \$4.50 for an eight-hour day. An effort will also be made by the organization to regulate the apprentice system, with a view of cutting down the number of apprentices.

The first three cargoes of ore from the Crete Mining Company of the Mesaba range were received at the lower lake ports within the last two weeks. The interests represented by this company are the Youngstown Iron Sheet & Tube Company, Youngstown; Pickands-Mather Company, Cleveland, and the Ohio Iron & Steel Company, Lowellville. They have three mines developed, known as the Troy, Albany and Utica. The aggregate amount of ore contained in these properties is estimated at about 13,000,000 tons.

# The Iron Age

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DAVID WILLIAMS COMPANY,	- - - - -	PUBLISHERS.
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JOHN S. KING,	- - - - -	BUSINESS MANAGER.

## The Administration and Currency Reform.

In his message the President is very vague in his references to the reform of the currency. He speaks of the importance of an adequate volume of bank circulation, and a volume that will increase at the seasons when the demand for currency is unusually large. There is pretty general agreement as to the end to be attained; the differences of opinion relate to the means of attaining that end, and the duty of Congress is to adopt the necessary means. In regard to these means there appears to be so much difference of opinion among the members of the Currency Committee of the New York Chamber of Commerce that the committee will not attempt to draw up a measure, but will content itself with stating the difficulties of the present position, and describing in general terms the conditions that ought to be established.

But in his report the Secretary of the Treasury is specific enough, and he goes a little further than the more aggressive of the currency reformers. He shows how small the circulation of the National banks is compared with their capital, the circulation secured by bonds being considerably less than 50 per cent. of the capital, and on account of the price of bonds the circulation has little or no tendency to increase. The circulation based on bonds—that which is secured by a deposit of money is in process of retirement—actually decreased during the last fiscal year. During the present fiscal year there has been some increase, but the Secretary regards this as due wholly, and he is probably correct, to the unusual efforts of the department to induce the banks to take out more circulation; for example, allowing them to deposit other than Government bonds to secure deposits of public moneys, and then take out additional circulation against the Government bonds thus released. The increasing business of the country in the autumn brings with it increased demand for currency. There has been a considerable increase in bank capital, and yet the active bank circulation would have decreased during the last 12 months had not the Treasury resorted to unprecedented measures to induce the banks to take out more circulation. It is worth notice in passing that the Secretary says that the banks would have added \$50,000,000 to their circulation but for the foolish provision of law limiting the retirements of notes to \$3,000,000 a month. That law was passed to prevent a contraction of the currency and it operated to prevent an expansion at a time when the business community was in desperate need of an increase of circulation. Banks would not take out the additional circulation, which they could employ for a month or two, because it was likely to be many months before they could get it retired and stop the tax on it.

The Secretary doubts if a circulation based on Government bonds can be made advantageous to the banks. A reduction of the tax on circulation would merely advance the price of the bonds. Therefore he sees no remedy for the present situation—as indeed there is none—except to permit the banks to issue notes upon their general credit, which, with an efficient system of re-

demption, would promptly return to the issuing banks and be retired when no longer needed. This is commonly called the asset currency proposition, but its other advocates propose that the notes should be a first lien on the assets of the bank, while the Secretary sees no occasion for this, and refers to the computations of the Treasury actuary that a tax of one-eighth of 1 per cent. on circulation would have redeemed all defaulted notes since the national bank system was established. Therefore, he thinks it sufficient to provide a redemption fund by a small tax on circulation.

But if it is unnecessary to make the notes a first lien on all a bank's assets, it is also harmless to do so, and there is no doubt that making the notes a first lien on the assets would give the public confidence in the circulation. The only objection to making the notes a first lien on the assets is an alleged discrimination against depositors, but this is only apparent; the substance of that discrimination exists under the present law, which requires a bank to set aside a part of its assets for the purchase of bonds to secure the note holder. But the redemption fund would be sufficient, and if Congress and the public did not object the Secretary's recommendation might be enacted without danger to note holders. The Secretary thinks that the amount of notes which the banks should be permitted to issue should be less than their capital, not because it would be really unsafe to allow them to issue to the amount of their capital, but because it is prudent to adopt reforms gradually. As the banks are now issuing notes to the amount of about 47 per cent. of their capital, omitting notes in process of redemption, permission to issue 75 per cent. of their capital would allow a large increase. Under this system the banks would increase their circulation in the fall, for they not only could, but they would have to, retire the extra circulation as soon as the need of it passed.

The Secretary does not think it necessary to require the banks to deposit bonds to secure deposits of public money, but does not advise a change of law in this respect. He does very properly advise that the Treasury should be allowed to deposit in the banks any of its funds, and funds that have once been paid in to the Treasury. At present customs collections cannot be deposited, nor can any money be deposited that has once reached the Treasury. His recommendation would obviate the locking up of large sums of idle money in the Treasury when the business community was suffering from a stringency.

## Government by Injunction.

A novel development in labor troubles is reported from New Jersey. It appears that the employees of a glass company struck, and as usual the strikers began to picket the factory to "persuade" those desiring to work not to do so. Usually the strikers are strong enough or numerous enough to have their own way in a little matter of this kind, even if they use rather strenuous persuasive methods. In this case the tables were turned. The company employed an overwhelming force of armed guards, who not only drove the pickets away from the vicinity of the factory but also drove them from the railroad station so that they could not meet incoming trains to "persuade" workmen arriving from other localities. Here was a pretty state of affairs. The strikers could not muster either sufficient numbers or sufficient courage to cope with the guards, and they have turned to the courts for relief. Upon application of the Glass Bottle Blowers' Association of the United States and Canada, a State judge granted an order to show cause why an injunction should not be issued restraining

the glass company "from interfering with the legitimate business" of the strikers, who maintain that they have the right to "persuade" workmen to leave or not to enter the company's employ. The action of the judge is not to be criticised, as it is his duty to inquire into an alleged wrong when a charge is made before him, but it will be very interesting to learn the conclusion of this remarkable episode. In view of the frequent lawlessness of pickets it will be regrettable if this effective method of dealing with them should be judicially denounced. On the other hand should an injunction be granted against the glass company what becomes of the outcry of labor unions against "Government by injunction?"

### Unions in the Building Trades.

Several occurrences involving labor difficulties in the building trades in this vicinity have freshly called attention to the vexations which harass employers in this field of operations. An aggravating case is that of a contracting painter whose business extends over several cities. Although employing union labor in this city he has a strike on his hands because the painters happen to have two unions and demanded that he should discriminate in favor of one of them, which is strong here but not in other places. The unfortunate man was unable to avoid a strike either here or elsewhere, as his employees in other cities would have given him trouble if he had yielded to the demands of the New York union.

The builders and contractors along the border line of New York and Connecticut have stopped all operations until they can settle the question whether trades unions shall use employers to collect fines imposed by the unions on their members. It has grown to be the practice when members of unions refuse to pay such fines to prevent other union men from working for the employing builder or from working on any building or contract on which he is engaged until either the delinquent workman pays his fine or is discharged. The unions may thus tie up a builder's business completely for no grievance whatever, but for the sole purpose of collecting an obligation from one of their members. The rural New York and Connecticut builders and contractors have organized to fight out this and other vexatious exactions of the unions and have locked out their workmen with the expressed intention of keeping them out until they agree to a more reasonable line of conduct.

The condition of the building trades in this locality is fast getting to be intolerable, and it will not be surprising if at some time in the near future the metropolitan builders and contractors follow the example of their brethren along the State line and determine to institute needed reforms. The claim is made that building construction in this city costs far more than in any other large city in the country by reason of the limited work performed per man. A flagrant example of this is found in the case of structural work on steel buildings. With the same number of hours per day and the same rate of wages, the erection of steel frame work in New York costs from two and a half to three times as much, as in other cities which are also supposed to be cities of high building costs. It is stated that a hand riveter who could easily average 250 to 300 rivets a day contents himself in this city with 80. In other cities, on straight work, a good man finishes up 80 an hour. The pneumatic riveter, which has proved such an annihilator of time in other cities, finds something different in the air of New York and strikes a slow gait. The same tool

in the hands of a man in any other city will drive 1500 to 2000 rivets in a day and only 250 or 300 in New York. It is no wonder that structural erection costs \$15 to \$18 a ton in this city as compared with \$6.50 to \$8 in other centers of building activity. There are other elements of cost here which should never have to be taken into consideration in such a business proposition as the erection of a building, as, for instance, fines against the contractor for trumped up charges, which simply mean that he is being called upon to pay the expenses of running the union or perhaps to meet an advance in the salary of a union official to which the latter may think he is entitled.

It was precisely such a state of affairs in Chicago that brought on the great lockout of 1900 which continued for almost the entire year. Up to that time no city in the Union was so "easy" from a trades union standpoint as Chicago. It was the shirkers' paradise. The labor day was nominally eight hours, but apparently every man was under instructions not to do more than an able-bodied man could easily turn out in six. Employers were constantly being mulcted in fines for the benefit of the unions or the officers of unions. But the day came when the employers resolved to act and they wrought a great change in the conduct of the unions. It was a costly fight, but it had to be made, and Chicago is a better city as a result of it. Some day the building trades unions in New York will pass through the same experience if the leaders do not change their tactics.

## CORRESPONDENCE.

### The Microstructure of Iron and Steel.

To the Editor: In a recent issue of *The Iron Age*, under date of November 20, 1902, appears an article by W. C. Post on "The Microstructure of Iron and Steel." (Address before the National Railroad Blacksmiths' Association.)

The article in the main is very good. I am glad that such an important item as the structure of iron and steel should be brought to the attention of such useful artisans as railroad blacksmiths. Much costly material passes through their hands, and, since so much depends upon the thoroughness of their work, it is a commendable step to incite their interest in the phases of the heat treatment of steel, so that they may attain a greater degree of refinement in their work of forging, annealing or tempering than would be possible without a knowledge of the intricacies of the art. It would, indeed, be a source of infinite satisfaction to reduce to their lowest expression all uncertain conditions. Such can be attempted by intelligent workmen, but should the information acquired be of an inaccurate nature, pertaining to the structure of iron or steel, their latter state would be worse than their ignorance.

Referring to the reproductions of the micrographs, it must be said that they are excellent, with one exception: Fig. 6 to an experienced metallographist suggests over-etching or overexposure in photographing, so that the structure is obliterated, leading to a misinterpretation of the treatment the specimen received in respect to heating. Fig. 7 is a good representation of strongly heated steel, showing the effect of a partial removal of the carbon. The notation, though, is erroneous. Is it possible to destroy the microstructure by simple heating? It is not to be denied that it can be changed from one form to another by varying the degree of temperature in heating and, subsequently, rate of cooling, but no matter what the treatment, there will always remain a consequent structure, which, by proper development for microscopical examination, cannot be termed other than a microstructure.

In speaking of the size of the crystals as affecting the physical properties of steel, it is again apparent that the author is in error when he states a small crystalliza-

tion will increase the tensile strength, and conversely the larger the crystals the less the tensile strength for a given grade of steel. I cannot agree with him that the degree of crystallization materially affects the strength of steel, a point he emphasizes by referring to it at least four times in the above named paper, so I take it that he is convinced of his position. Having some experience in the microscopical examination of steel, covering hundreds of specimens treated in a variety of ways, and noting in many cases the correlated physical properties, I must confess never having observed the feature mentioned by the author, but my deductions, as a result of daily study, are that for a given composition the difference between the tensile strength of a given piece of steel with a coarse structure and one of refinement, by properly annealing, is so slight that it cannot be explained by the varying degrees of crystallization. I would rather infer that a coarse structure signifies a slightly higher tensile strength than a fine one. From an average of a large number of test bars of metal as cast, produced in regular steel casting practice, where the variations in composition between one heat and another are so slight as to be disregarded, comparing them with a corresponding number of test bars from similar steel, but with a finer micrograin given by heat treatment, it can be said that the finer grained bars are 2 per cent. weaker in terms of tensile strength in pounds per square inch than their fellows with the larger crystals. With a breaking strain of 80,000 pounds per square inch, a variation of 2 per cent. is too slight to be considered.

But considering another property of steel—*i. e.*, ductility—herein the structure of steel plays an important part. I am sure all steel users will agree that it is better to have certain kinds of steel bend before breaking in preference to snapping or exhibiting brittleness. Considering tensile strength alone, with large crystals steel is more or less treacherous and uncertain. Without a material sacrifice in strength by refining the crystals steel is in the best condition where strength and toughness combined are desirable. So, had the writer impressed upon his friends, the master blacksmiths, the feature of ductility as a result of intelligent heat treatment, he would have done much to lessen the woes of the metallurgical world at large.

WILLIAM M. CARR.

ST. LOUIS, November 25, 1902.

NOTE BY THE EDITOR.—We have omitted from the above communication some further criticisms on the photographic reproductions, pointing out a few errors for which Mr. Post was not responsible. These particular errors were caused by the omission of other photographic reproductions, which were not deemed necessary, and the consequent rearrangement of the system of numbering the illustrations. These errors are obvious to experienced metallographists, but we enumerate them as follows for the benefit of others who are interested in Mr. Post's presentation of the subject: The last paragraph in the first column on page 12 refers to a view which was omitted and not to specimen No. 5 as stated. In the second column on the same page the statement is made that "Fig. 6 shows one of the many spots wherein the crystals were abnormally large," but this also refers to a view which had been omitted. The paragraph immediately following should be read as referring to Fig. 6, and not Fig. 7.

The Northwestern Steel Company have organized at Seattle, Wash., and are assembling the machinery for the construction of a rolling mill for the manufacture of bar iron. For the present only a 9, 12 and 16 inch mill will be installed. The company intend to put in an open hearth steel plant in the near future. William Pigott of the Railway & Steel Supply Company is interested.

The Youngstown Telegram, Youngstown, Ohio, published a special industrial issue November 26, containing a great deal of interesting information regarding the iron and steel works in that increasingly important manufacturing district. Among the leading illustrated articles

are descriptions of the works of the National Steel Company, the American Steel Hoop Company and the Youngstown Iron Sheet & Tube Company.

## The Tennessee Company's Improvements.

We have received the following concerning the improvements that are under way, or have been decided upon, by the Tennessee Coal, Iron & Railroad Company: At the iron mines nearly all of the hoisting plants are being replaced by others of greater power and capacity, the new machinery being of such size and power that the vein can be followed to the depth of nearly a mile without additional equipment. All but two of the old crushers have been displaced, and others of larger capacity are now, or soon will be, at work. As a result, all of the ore will be properly prepared for furnace use. Two compressing plants, each consisting of two compressors, will, after a few months, supply all of the air that is needed at mines No. 1 to 9, inclusive; the other mines being too far distant to be supplied from one of the new plants and too scattered for one plant to supply them all. It has been necessary to replace nearly all of the old boilers with new ones, and to provide for a larger water supply. The new machinery will be inclosed in brick buildings, and nearly all danger of fire will be avoided. New offices have been erected and a number of dwellings, and of the latter a number are still to be built. Convenient hospitals for the injured and ill have been provided.

For the coal mines three new hoists have been ordered; one of which has arrived. There are also several new boilers. As rapidly as possible, the most productive and important of the coal mines will be equipped with boilers and hoists of ample power. One new fan, with a capacity of 250,000 cubic feet of air per minute, is being set up, and an electrical power plant for the movement of coal underground has been or soon will be ordered. Additions are being made to the pumping plants, so that the mines may be dry at all times, instead of being idle, as heretofore, because of the presence of water from three to six months of each year. Some compressors will be removed from the iron mines to the coal mines, so that advantage may be taken of compressed air for such rock work as there is to do. New pumps have been placed and a number of men dispensed with.

Nothing has been done to the coke ovens, except to put them in better condition and more carefully and intelligently direct their operation.

At the Bessemer furnaces nothing has been done beyond the addition of a number of boilers, but an electrical plant for lighting the five furnaces at Bessemer, the rolling mill, the buildings, and some of the mines at Muscoda, will be set up within a few months.

At the Ensley furnaces new bins of large capacity are now being erected. Through them will pass ore, limestone and coke, which will later be moved to skips by electric trolleys. Five initial and five compound blowing engines have been ordered for the Ensley furnaces. The first should arrive in February next, the rest following at intervals of about 30 days. These will take the place of ten that are now there, some of the latter going to other furnaces. It is the intention of the company to enlarge four of their five Ensley furnaces, making each stack of a capacity of from 300 to 350 tons per day. Skip hoists will be used and such additional boilers as may be needed.

At the steel plant such changes and additions are being made as experience has shown to be necessary. The foundations for the mixer are in and the open hearth building is being extended, so that cranes and ladles can be used and the fore hearths, that have proved very objectionable, can be removed. A large yard crane is in place for handling heavy billets and blooms. A new building will be erected, and in it will be placed the electric generators, steam for the engines that operate them being supplied from a battery of boilers that will be heated by waste gases from No. 4 coke ovens.

An engine for the blooming mill should arrive in February to take the place of the broken one now in use. The new engine, being much more powerful, will take care of a large increase in the daily output. A water purifying plant has been in use since August and the water for all the Ensley plants and the adjacent mines is now pure.

The rail mill is completed and has rolled 60 and 80 pound steel rails. It will not be operated for the regular manufacture of rails until the changes in the open hearth department are completed.

### The American Tube & Stamping Company's Increased Capital.

The American Tube & Stamping Company, Bridgeport, Conn., have filed a mortgage on their property for \$1,500,000, to cover an issue of bonds certified to by the Colonial Trust Company of 222 Broadway, New York, who will act as trustees. The company have for some time been engaged in the erection of open hearth steel works and a billet mill, and expect to attract to their city many other manufacturing concerns by the establishment of works capable of producing the raw material for them. The directors of the present company, organized about a year ago and who succeed, under the special charter granted by the State of Connecticut, to the business, plant and interests of the Wilmot & Hobbs Mfg. Company, are as follows: Edwin Langdon, president of the Central National Bank and Merchants' Trust Company of New York; Edwin G. Sanford, president of the City National Bank, Bridgeport; Charles R. Wilmot, manufacturer and treasurer in Orange, N. J.; Frank A. Wilmot of Bridgeport, president and treasurer of the company; Albert N. Stanton, vice-president; Clarence D. S. Miller, second vice-president; Henry W. Nutt, late of Pittsburgh, and there engaged in the steel business, secretary.

The company state that, to meet the demands of their trade and the extensive improvements and increased facilities added and being added in various departments, the stockholders met on October 21, 1902, and unanimously voted to issue first mortgage 5 per cent. 30-year gold bonds. The authorized amount covered by the mortgage is \$1,500,000, \$1,000,000 of which has been authorized as for sale, the balance being held under certain conditions pending further plant and other developments.

The Drew property recently secured as a site by the company for the erection of the open hearth steel works and billet mill is exceptionally valuable and favorable for a plant of this kind. It is located at the entrance of Bridgeport harbor, and has about 2600 feet for dock frontage on deep water channels. This location, accessible to ocean going steamers from all parts of the world, and with unsurpassed railroad facilities, has a high commercial value as an independent proposition entirely apart from its connection with the company's mills located in the west end for producing hot and cold rolled hoop, strip and bar steel and pressed, stamped work and patented specialties.

As the company decided not to increase their capital stock, preferring to issue bonds to raise additional capital, and have provided in the bonds that they are subject to call, under certain conditions, at a premium of 5 per cent. above par, and have further obligated themselves to retire, at this premium, \$10,000 par value of the bonds each six months for 20 years, beginning April 1, 1905, if not sooner retired, it is evident that they look upon this bond issue as a temporary matter. It is believed by members of the company to be quite probable that the company will use every effort to retire rapidly these bonds out of their profits, and that they will actually sell only such portion of the bonds as may best conserve the interests of the stockholders in enhancing their profits through doing a larger business.

The new steel works of the company are progressing nicely, hundreds of tons of structural iron being already on the premises and partly erected. A 60-foot span crane runway extends along the eastern side of

the 800-foot long building. This outside crane is designed for loading and unloading cars, and is capable of lifting about 15 tons. There will be four more of these electric traveling cranes within the building, three of about the same capacity, and one of 75 tons, which will be used principally for carrying the ladles of molten steel from the steel melting furnaces. Single castings up to 100,000 pounds can easily be made, and with the electric crane picked up and loaded into cars run into and throughout the length of the works from the tracks of the steam road over the new Belt Line Freight Railroad laid down by the company to connect their own works and the many factories along the line with the steam railroad.

The steam plant is being equipped with the Wilkinson type of automatic stokers which feed the cheapest waste coal dust from hoppers—also automatically filled from vessels at the company's own docks or from the stock coal piles—on the grate bars where it is burned with forced draft automatically controlled to preserve a uniform boiler pressure. The boiler house for this new plant contains 12 boilers, yielding about 4000 horse-power. The electric power and lighting plant comprises three large direct connected engines and dynamos or generators capable of developing about 1000 horse-power, which, as the work is somewhat intermittent, is sufficient for running the electric railroad and cranes, furnishing about the equivalent of 5000 incandescent electric lights.

The gas producer house will have extra large gas producers for furnishing gas for use in the open hearth furnaces and ingot heating furnaces and will have a capacity for transforming 150 tons of coal into gas per day. The boilers will, in addition, use about one-half this tonnage of fuel. Fuel contracts covering a number of years at low prices were made before starting these works.

In the main building besides the open hearth furnaces, &c., will be a reversing blooming mill to reduce the ingots to a billet bar 2 to 4 inches square or a slab an inch or more in thickness and up to 16 inches wide. It will also contain shears to cut the billet bar into lengths of 1 to 6 feet, as required. By gravity these short pieces or billets are loaded on steel cars on the 3-foot gauge railroad, of which the company have laid some miles of track about its works and down to the docks. The cars are first run under a cooling shower and then to the powerful hoisting machinery on the company's docks, by which they are loaded on lighters or barges, which, at a cost of but a few cents per ton, transport the billets to the company's finishing mills located on Cedar Creek, Black Rock Harbor, in the West End, or to the many other finishing mills located on tide water along the coast; or these cars may be run under the electric traveling crane alongside the billet mill and there picked up bodily and the load dumped into platform cars furnished by the steam railroad, and all without a single billet being touched by hand.

The reversing engines in the steel mill are duplicates, except as to some minor improvements, of those in several of the most modern and up to date steel works in the country and which in some places have a record of having turned out, on favorable sizes of billets, some 800 to 1000 tons per day. The mill is fitted with the latest designs of hydraulic manipulator tables for turning the ingots after each pass in the rolls, and electrically driven reversing tables, the operation of all of which, including the hydraulically operated pressure screws on the roll housings and the throttle valve of and reversing link motion on the blooming mill engine are attended to by one or two men. The company are putting in everything new and of the very best of material and design. They expect to possess one of the most modern and up to date steel plants for its size in the world, but they will devote their energies principally to getting out their extra fine "Swedoh" grade of steel, on their reputation for which they have built up their immense business, and not try to run their works simply on a tonnage basis.

The company's trade lies principally in the East, and in making their steel at Bridgeport they minimize

freighting expenses and possess the great advantage of having always available the world's lowest markets in the purchase of, and the cheap freights obtainable only by water for transporting, their raw material; for example, the freight rate on such material in cargo lots from Europe is only about one-half that by railroad from Pittsburgh to the East, which will prove quite an advantage should the present duty of \$4 per ton on pig iron be taken off.

The officers of the company before starting the steel works made for months the most careful study of the plans of other steel works, both in this country and abroad, consulted many eminent experts and finally secured for their superintendent an eminent expert in this line of business, both as a designing and constructing engineer and also as a metallurgist.

It is explained, relative to present and future possible competition, that the company are in an enviable position in that a large and constantly growing portion of their business is in the line of pressed and stamped work; and that, while they do furnish some of their hot and cold rolled stamping steel to other manufacturers, whose trade they invariably respect and endeavor to protect, their facilities for rolling such material give their own stamping business a great advantage. As regards their open hearth steel billet production, that department, as already explained, has been added primarily for the furnishing of their own finishing mills with their raw material, and the products of this particular department are not intended for the general trade and the supply of outside finishing mills.

When the extensive harbor improvements are completed at Bridgeport, a company will be formed by Pennsylvania and European capitalists to put up blast furnaces and coke ovens near these steel works on a site already offered by the American Tube & Stamping Company for the purpose. Such a development would bring to Bridgeport much of the extensive foundry trade of New England for pig iron, and would add greatly to Bridgeport's prosperity.

## MANUFACTURING.

### Iron and Steel.

Follansbee Brothers' Company of Pittsburgh, manufacturers of and dealers in tin plate and metals, have sold their dipping plant on Preble avenue, Allegheny. They will abandon this plant just as soon as their new sheet and tin plate mills, now building near Wheeling, W. Va., have been completed, which will be some time in April or May of next year.

C. L. Hastings, Keystone Building, Pittsburgh, representative in that city of the Bethlehem Steel Company has received a contract from the Herreshoff Mfg. Company for the billets for the plates, sheets and angles for the new cup defender. These billets are to be made of the Bethlehem Steel Company's standard grade of open hearth nickel steel, and to be delivered to the different rolling mills to be rolled into shape.

The Jones & Laughlin Steel Company, Pittsburgh, have a new billet mill nearly completed and expect to put it in operation early in the year. The new blooming mill was started some time ago. There is no intention of adding a rail finishing plant to the new billet mill, although the mill itself is capable of being transformed. Some further changes would be necessary to make rails, as under the present alignment there is not room enough to add a rail finishing plant. The company have three converters in operation, and are using the first of a lot of some 50,000 tons of foreign Bessemer pig iron contracted for recently.

The new plant of the Huntington Tin & Planished Plate Company, Huntington, W. Va., which was recently put in full operation, is reported to be running successfully and turning out a high grade of planished sheets.

The Niles, Ohio, stack of the National Steel Company was banked down last week on account of coke shortage, making the second time this stack has been shut down for the same cause. This is the fifth stack of the National Steel Company in the Mahoning and Shenango valleys that has been taken off blast for the same reason in the past week.

A number of officials of the Cuyahoga Wire & Fence Company, Cuyahoga Falls, Ohio, recently visited the plant of that company at New Castle, Pa. In the party were E. A. Henry, Cuyahoga Falls, president; William Logan, New York, vice-president; F. J. Miller, Cuyahoga Falls, secretary; W. H. Reed, superintendent of the Cuyahoga Falls Works, and W. J. Miller, also of Cuyahoga Falls. It is understood that some improvements and additions to equipment are to be made to the New Castle Works.

We can state officially that the report that the new Union Steel Company, recently organized in Pittsburgh by a merger of the Union Steel Company and the Sharon Steel Company, would take over the Youngstown Iron Sheet & Tube Company at Youngstown, Ohio, is incorrect. No move of this kind is contemplated at the present time.

The 30-inch, 42-inch and 128-inch plate mills at the Homestead Steel Works of the Carnegie Steel Company will close December 7 for one week, during which time they will be overhauled and put in first-class condition. These mills have been pushed very hard the past year and are in need of repairs. As soon as they have been put in good condition other small plate mills in this plant will be closed for repairs.

Frank L. Smith has been appointed receiver for the Shelby Iron Company of Shelby, Ohio, and has furnished \$10,000 bond. The appointment was made on the complaint of Joseph Goldberger, a leading stockholder.

### General Machinery.

The Charlotte Supply Company of Columbia, S. C., recently incorporated, will be practically a branch of the Charlotte Supply Company of Charlotte, N. C., who have been in the general mill supply and leather belting manufacturing business for the past 12 years.

The Old Dominion Iron Works, A. Warren, proprietor, Berkeley, Va., advise us that they are in the market for lathes, boring mills, shapers, drill press and steam hammer for the new plant they are to erect at Colonna's shipyard on the Elizabeth River. The plant will consist of a machine shop, boiler works and blacksmith shop, and will be equipped with latest improved machinery for ship repairs, both iron and wood. The improvements will represent an outlay of between \$5000 and \$10,000.

The W. J. Clark Company, plate metal workers, Salem, Ohio, have just completed and are now installing in their works a hydraulic plate and bar bending machine calculated to work at a pressure of 146 tons. This is the third machine of this kind which the company have found it necessary to install in order to keep up with the growing demand for the Lane patent joint hangers and other plate steel and iron work in their line. Besides these three powerful hydraulic machines the company have a very complete equipment of steam driven machinery for sheet and plate metal work of any description specified for by construction engineers and others.

One lathe for turning large pulley wheels and one or two overhead traveling cranes are required by the recently organized Virginia Machine Company of Waynesboro, Va. The company have purchased the plant of the Basic City Car Works Company on the Chesapeake & Ohio and Norfolk & Western Railways, at Basic City, Va., and that of the McGahey Engine Company of Elkton, Va., and will consolidate both plants at the former place, where they will continue the building of the McGahey patent stationary engines as their principal business. In purchasing the plants the company have secured a large equipment of up to date machinery for making railway equipment, roll grinding machines, &c., and will pay special attention to the regrinding and recortugating of mill rolls. They will also do general machine, foundry and repair work. The company expect to have their plant in operation before January. The officers are: J. A. Patterson, vice-president of the South River Bank, Waynesboro, president; M. J. Fulton of Front Royal, vice-president; T. A. Sammis of Basic City, secretary and treasurer, and R. G. Vance, cashier of the South River Bank, Waynesboro, general manager. These with R. W. Crowder and J. Frank Patterson of Waynesboro, Oder Harrell of Front Royal, and E. B. and J. B. McGahey of Elkton, constitute the Board of Directors.

The National Machinery Company, Tiffin, Ohio, report that business in the bolt, nut and special machinery trade in the last 30 days has been exceptionally good. Judging from the orders on hand and the inquiries received, and considering the fact that this is the dull season of the year, the company look for a large volume of business the first of the year. Rumors of decreasing trade are not substantiated, and the company's plant is running to its full capacity to take care of what in their opinion promises to be the largest year in their history. Foreign trade is picking up, and very substantial orders have been received from France and Germany.

The Fairhaven (Wash.) foundry and machine shop recently acquired by the Northern Pacific Railroad has been purchased by J. T. Graham, for many years foreman of the plant under the old management. Mr. Graham's associates are J. W. Zeeve of Seattle and W. A. Sparks of Whatcom, Wash. The plant is to remain at Fairhaven and additional machinery installed to make it up to date in every way.

The Wheeling Mold & Foundry Company, Wheeling, W. Va., will install in their Lower Works a 10-ton electric traveling crane 28 feet span. They operate two works, known as the Lower and Peninsula plants, to full capacity and are filling a large number of orders for rolls and rolling mill machinery of all kinds. At their Peninsula Works a pattern storage house 25 x 100 feet will be added.

The Improved Socket & Chuck Company have been organized at Braddock, Pa., to manufacture attachments for machine tools. The company will place on the market improved drill sockets and chucks. The officers are K. O. Muehlberg, president; William

Seng, treasurer, and John A. Loew, secretary. Mr. Muehlberg, the inventor of the attachments, was formerly connected with the Braddock Tool Company.

The Fox Typewriter Company, Limited, Grand Rapids, Mich., report that business in their machinery department has never been better than it is at present and that the outlook for the future is extremely satisfactory. They have recently disposed of the sash pulley business which was carried on by the Fox Machinery Company in connection with the manufacture of machine tools and wood working specialties. To provide for the increase in business which the company have experienced recently two buildings are being erected. The engine and boiler room is also being enlarged for the installation of a 150 horse-power engine and boiler.

The Canadian Niagara Power Company have awarded Escher, Wyss & Co. of Zurich, Switzerland, a contract for three 10,000 horse-power turbines to be installed in the Canadian wheel pit now in course of construction. It is understood that the new wheels will be similar in design to those installed by the Niagara Falls Power Company in wheel pit No. 2 on the New York side. The contract goes to the Switzerland firm because there are no shops in Canada at present, it is said, capable of building the mammoth wheels, which, it is stated, will be the largest in use at Niagara. The turbines are to be delivered within a year.

The American Blower Company, Detroit, Mich., report the following orders on their books: Geo. H. Hammond Company, Chicago, 16 large steel plate fans; Lehigh Valley Coal Company, forced draft fans for shops at Centralla and Wilkes-Barre, Pa., and induced draft apparatus for the Corinth (N. Y.) mill of the International Paper Company, Princeton (N. J.) University, and the Binghamton (N. Y.) Electric Light & Power Company. They are building heating apparatus for the Iron City Sanitary Mfg. Company, Zellenople, Pa.; Enterprise Mfg. Company, Columblana, Ohio; B. F. Lee Company, Braddock, Pa.; Monongahela (Pa.) Forge & Furnace Company, New York Glucose Company, Edgewater, N. J., and the Michigan Malleable Iron Company, Detroit, Mich.

Plans have been completed for the new plant of Hugo Bilgram at 1221-1233 Spring Garden street, Philadelphia. The building will be 100 x 119 feet, five stories high, but only two stories and the basement will be erected at present. An Otto gas engine, already ordered, will be installed.

The Gustafson Mfg. Company, Chattanooga, Tenn., have removed the equipment from their old works at Sequatchie, Tenn. They have installed a new drill press and turret lathes, are now erecting a new punch and drop hammer, and have made arrangements to put in a new large lathe, boring mill and planer. They are now making a specialty of manufacturing self oiling loose wheels for mining cars, a self oiling tight wheel on axle and a roller bearing wheel loose on axle, all designed and patented by one of the members of the firm. They expect in the near future to commence the manufacture of steam and water valves, their own invention and patent, for which patterns and special tools are now ready. They are at present engaged on mine and furnace equipments. The company will be incorporated under the State laws of Tennessee with a capital of \$30,000.

Wickes Brothers of Pittsburgh are erecting in that city a new machine shop, 50 x 100 feet, having a lean-to 27 feet on one side. In this shop the firm expect to install more modern machinery than they have heretofore used, to better enable them to fill their wants, to get out more work and furnish work more promptly. In fact, the new shop will give better facilities in every way. They own a good deal of ground adjacent to the new machine shop which will probably be utilized at some future time for additional shops. However, nothing definite in this direction has been decided upon. The firm recently received an order from the Tennessee Coal, Iron & Railroad Company of Birmingham, Ala., for 2400 horse-power of vertical water tube boilers, and one from the Bon Air Coal & Iron Company of Nashville, Tenn., for 400 horse-power of vertical water tube boilers.

Plans have been made for the machine shop, repair shop and roundhouse to be built by the Baltimore & Ohio Railroad at New Castle Junction, Pa. The machine shop will be 60 x 200 feet and the storehouse and repair shop will be smaller. The roundhouse will have a radius of 190 feet and will house 40 locomotives. Paul Didier, assistant engineer, will be in charge of the work.

The Union Steel Company, Frick Building, Pittsburgh, have just placed a contract with the Brown Hoisting Machinery Company of Cleveland, Ohio, through their Pittsburgh office, H. C. Torrance, manager, for the installation of an ore conveying plant at the South Sharon Works of the Sharon Steel Company, now owned by them. The equipment will be of the usual design and will automatically unload ore and other fuel to be stored until charged in the furnace.

The Ohio Machinery & Construction Company of Cleveland, dealers in second-hand machinery, steam shovels, hoisting engines, &c., have opened a warehouse at 171-179 Merwin street, that city.

The Shelby Motor Car Company of Shelby, Ohio, have broken ground for an addition to their plant and are preparing to purchase a considerable amount of new machinery. They will manufacture large gasoline touring cars another season.

The Marion Steam Shovel Company of Marion, Ohio, made a Thanksgiving present to their employees who were faithful to the company during the recent strike. The bonus averaged about \$50 per employee, and in addition to this from \$5 to \$30 per man was given to about 200 workmen who have entered the employ of the company since the strike.

The Lucas Pump Company of Toledo have entered the combination known as the United Pump & Supply Company. P. McCrory and George Kinzler, principal owners of the Lucas company, have become interested in the new company, who represent the old Standard Mfg. Company of Toledo, the Bean-Chamberlain Company of Hudson, Mich., and the Lucas Pump Company. Work has been started on a large plant near Toledo and the interests of the three concerns will be consolidated there.

The Southern Pacific Railroad Company advise us that they will double the size of their machine shop at Los Angeles, Cal. In addition the company have decided to add a new paint and new car shops. R. H. Ingram is superintendent.

The Owen Tool Company of Springfield, Ohio, are completing their new plant replacing the one destroyed by fire some months ago. A large amount of new machinery is being installed.

The Gas Machinery Company of Cleveland have been incorporated with a capital stock of \$50,000 by Pierre Planting, W. E. Steinwell, A. M. Smith, F. C. Howe and Walter Lucas. They will establish a plant for the manufacture of gas machinery.

The Standard Adding Machine Company, St. Louis, Mo., advise us that they are in the market for a considerable amount of small machinery in the way of milling machines, screw machines, drill presses, &c., for the new plant they are building. The question of purchases is now being considered, the only order placed so far being one with the Wangler Company for boilers.

It is expected that the new plant of the Keystone Drop & Forge Company of Chester, Pa., will be ready to put into operation by the first of the year. The entire plant is 60 x 220 feet, and comprises a machine shop, boiler and engine rooms, hammer shop and storeroom. The hammer shop will be built on original plans and will be 65 x 80 feet. The equipment will be most modern throughout, the power being furnished by a 200 and a 150 horse-power engine with sufficient horse-power of boilers. The iron work on the plant is being done by the Belmont Iron Works.

#### Boilers, Engines, &c.

The stockholders of the Quincy Engine Works, Quincy, Ill., have unanimously voted to increase the capital stock of the company from \$250,000 to \$400,000. The proceeds of the new issue will be partially used in the purchase of additional tools and possibly to make extension of the foundry which will double the present capacity of the plant.

Wm. S. Jenks, secretary of the Strang Engine Company, Chicago, who recently returned from California, advises us that it is the expectation on the Pacific Coast that the better grades of California crude oil will be used to advantage in explosive engines. This, as Mr. Jenks says, is important if true. The Strang Engine Company after thorough tests are now prepared to place on the market their automatic ignition kerosene or gasoline engines. The works of the company are at Harvey, Ill.

A one-third interest has been purchased in the Pease Engine & Machine Works, Goshen, Ind., by Dole Hamilton of that city. The remaining two-thirds of the company's stock is owned by Henry W. Pease and J. W. Maier. Their business is increasing rapidly and orders are being received in such number that it is proposed to install additional machinery and increase the working force as soon as an inventory of the plant, which is now being taken, is completed. The company will be incorporated soon.

L. S. Kirker, formerly chief electrician of the Wheeling Steel & Iron Company, at Wheeling, W. Va., with other parties has bought the plant of the Center Foundry Company. The new owners have purchased the Pittsburgh Engine & Foundry Company and will manufacture a special line of gas engines of which Mr. Kirker is patentee.

Sealed proposals are being received at the engineers' office, United States Army, Norfolk, Va., until December 4 for furnishing generator, engine, switchboard, boiler and chloride accumulator elements for the electric plant at Fort Monroe, Va.

The village of Sebring, Ohio, will shortly commence work on the erection of a new water works pumping station.

The Pittsburgh & Conneaut Dock Company, Conneaut, Ohio, are preparing to erect an electric power plant with a view to operating all their unloading machinery with the possible exception of the clam shells, by electricity. The haulage system used in moving freight cars will also be operated by independent motors. Contract for the work has been placed with a Pittsburgh engineering concern.

The Citizens' Gas & Electric Light Company, Elyria, Ohio, are adding to their electrical equipment and installing a heat-

ing plant to furnish hot water. They are installing three 250 horse-power Babcock & Wilcox boilers, which are to be fitted to burn natural gas.

The Akron Steam Heating Company have been given the right to erect a plant at Akron, Ohio, and lay pipes throughout the city. The company will be organized with a capital of \$100,000.

#### Foundries.

The Clinton Burnham Foundry Company, Milwaukee, Wis., being unable to get coke and iron, have closed down their gray iron foundry temporarily. The company cannot determine at this time when the foundry will resume, but it is expected that the crucible steel department, which has been added recently, will be in operation within a few days.

The Wisconsin Foundry & Steel Works, Cedar Grove, Wis., which have been in business but a short time, have secured such a large number of orders for their ranges and other products that they are compelled to erect additional buildings, for one of which, 60 x 60 feet, ground has already been broken. It is expected to have the latter building ready for installation of machinery within 60 days.

The new foundry of the American Ship Building Company at Detroit, Mich., will be equipped with 72 and 42 inch Newton patent cupolas, made by the Northern Engineering Works, Detroit. The new buildings are nearly under roof, and when completed the plant will be a model one for heavy casting work.

A company, composed of R. G. Horn, Edward C. Miller and Frank R. Evans, have leased the plant of the Union Foundry & Stove Company, Zanesville, Ohio, at present in the hands of a receiver, and if the permission of the court can be obtained the plant will be placed in operation at once.

The Boll Brothers Mfg. Company, Harrisburg, Pa., have about completed their new foundry. All equipment has been purchased.

#### Fires.

F. M. Poozer & Sons' machine shop, at Bamberg, S. C., was destroyed by fire recently. The loss is \$3000.

The plant of Swift & Co., Chicago, was considerably damaged by the explosion of a large boiler November 29. The loss is estimated at nearly \$50,000.

The plant of the Currie Fertilizer Company, at Louisville, Ky., was damaged by fire Nov. 28 to the extent of \$50,000.

#### Hardware.

Waltham Mfg. Company, Waltham, Mass., manufacturers of bicycles and motors, are now constructing a three-story frame addition to their plant, 110 x 45 feet. Most of the equipment has been ordered.

The Cambria Foundry & Machine Company, Johnstown, Pa., have purchased ground at that place and will build a plant for the manufacture of shovels.

The Iowa Dairy Separator Company, Waterloo, Iowa, are building a new factory 50 x 200 feet. Hollow cement blocks will be used in construction.

The Ornamental Iron & Wire Company, Chattanooga, Tenn., are very busy with orders which cover a wide range of territory in the North, South and Southwest. They report having had a splendid business during the year and look for a much larger business during 1903. They have recently added an ornamental wire fence department. Their designs are very attractive. Their new No. 9 catalogue covering this department has just been issued. The company are in receipt of some nice orders for iron stairways of different patterns, stairways being one of their specialties. They are also unusually busy with their iron fence business. Their catalogue No. 8 shows numerous designs of these fences and will be sent on application. Besides the above named products the company have excellent facilities for making iron balconies, fire escapes, office and bank railings, and a general line of ornamental and structural iron, wire, brass and nickel plated work.

The Chattanooga Iron & Wire Works, Chattanooga, Tenn., have contracted with local builders for all the wrought iron work in the Army Park Buildings at Chickamauga Park.

The Thomas Mfg. Company, Springfield, Ohio, have purchased property just opposite their present factory and have commenced the erection of a brick and stone building, 50 x 100 feet, four stories high, to be used as a warehouse. The company have been very much cramped for room in which to store their manufactured goods, including hay rakes, tedders and loaders, disk, spring tooth and spike tooth harrows, disk, hoe and shoe drills, lawn mowers and iron pumps, the trade in which has materially grown during the past two years.

The E. Jenckes Mfg. Company, Pawtucket, R. I., are erecting an addition to their large plant for making knitting and other machinery, as well as for manufacturing bright wire goods, spring cotters and light hardware. The new building will be of brick, 200 x 64 feet, three stories high.

The Cambria Foundry & Machine Company, Johnstown, Pa., manufacturers of all kinds of shovels and shovel machinery, have been operating a shovel plant for the last year. They have purchased additional ground and increased their capital for the purpose of enlarging their entire business, consisting of shovel plant, mining car equipment, foundry and machine shop.

The Sandusky Tool Company of Sandusky, Ohio, are closing up the most prosperous year in their history. Last week shipment was made of the last lot of toy planes ordered for the season, the output on which has been over 150,000. The company are now averaging from 100 to 500 dozen hoes per day for the Southern market. The trade in German handled hoes is reported very heavy, and there is a strong demand for rice and sugar cane hoes from Honolulu. The demand from South Africa is about double what it was before the war.

The Clark Novelty Company, Rochester, N. Y., one of whose departments is the manufacture of cream separator and milk can faucets, on account of the constant increase of business in this line have perfected several special machines that are peculiarly constructed for finishing this class of goods. The company have had seven years' experience in the manufacture of this line and have built up a large and constantly growing business.

Geo. A. Ray Mfg. Company, Buffalo, N. Y., have virtually doubled their capacity in the last two years, and yet at the present time their works are running overtime. They have increased their line of house furnishing goods and metal hotel and restaurant goods, including a large assortment of coffee and tea urns. The company state that they have added many labor saving devices by which the cost of production has been cheapened.

The Hurst Mfg. Company of Canton, Ohio, manufacturers of hardware specialties, spraying pumps and chemicals, will erect a two-story brick building, 40 x 100. Other additions will be made next spring.

#### Miscellaneous.

The Steward & Romaine Mfg. Company of Philadelphia, Pa., manufacturers of expansion bolts, have recently made considerable improvements to their plant, which among other things included the complete refitting, &c., of their office.

The Illinois Metal Company of Granite City, Ill., advise us of the large volume of business they are handling for their products and more especially for babbit metal and solder, and in order to keep up with the demand they will greatly increase the capacity of their plant at once. It is claimed for their No. 10 Illinois white metal that it will run with less friction and will not pound out of boxes and cut journals. They claim tests by some of the leading rolling mills, and machine builders that justify high indorsement of the metal. After January 1, 1903, the company will be in position to quote the trade on pig lead, antimony and block tin in small quantities. They have issued a calendar which they will be glad to send on application along with a sample of No. 10 Illinois white metal.

The new varnish making plant of Pratt & Lambert, located on Tonawanda street, Buffalo, is about ready for operation. When fully completed it will consist of 36 buildings, 24 of which have been erected. Of these buildings the main one is three stories high and 100 feet square. In it will be located the boilers and engines that are to operate the works. All of the other buildings are one-story high, and five of them are 40 x 120 feet at the foundation. In these latter buildings are located the storage tanks. All of the 18 other buildings are smaller in size, averaging 20 x 40 feet, and in these will be done the melting, reducing, cleaning and drying. The 12 additional buildings are to be erected next year. One of these will be the office building. It will be of brick and stone, 50 x 110 feet, and will have three L's. In one L will be a laboratory and testing room, in another a printing room, where labels will be printed for the company's use, and in the third L a lunch room will be located. The cost of the entire plant will be about \$200,000. The company have other plants in Chicago and Long Island City.

The Cincinnati Equipment Company, Cincinnati, Ohio, recently incorporated with a capital stock of \$15,000, have purchased the old plant of the American Tin Plate Company at Cullom Station and will convert it into a railway supply manufacturing plant. Equipment has been secured and the plant will be ready for operation in December. The president is Isaac Joseph, and Morris Joseph is vice-president, both of the Isaac Joseph Iron Company. P. R. Warner, of Covington, Ky., is general manager.

Plans for the new plant of the Coplay Cement Mfg. Company, Coplay, Pa., call for a dry kiln building, 224 x 242 feet; clinker mill, 100 x 105 feet; engine house, 50 x 79 feet; stock house, 100 x 260 feet; raw mill, 42 x 100 feet; dryer building, crusher house, coal mill and conveyor house. The buildings will be entirely of concrete construction and will be absolutely fire proof.

The Sheridan Stove Mfg. Company, Quincy, Ill., are contemplating the erection of an addition to their stove plant, which will measure 120 x 180 feet. The improvements will be carried out early in the spring and the new building will be used for additional molding and nickel plating rooms.

James Caldwell, president of the Caldwell Furnace Company of Toledo, who operate plants in Toledo and Fort Payne, Ala., has sold out his three-fourths interest in the business to J. P. McAfee and C. E. Sutton of Toledo. Mr. Caldwell will spend some time in Oregon before again embarking in business. Mr. Caldwell purchased the plant from Captain Everett and E. W. Tolerton about four years ago, and under his management the business developed greatly.

## Lake Ore Matters.

### Heavy Shipments Being Made.

DULUTH, MINN., November 30, 1902.—Shipping is going forward as rapidly as though it was midsummer rather than the close of the last month of ordinary navigation. As far as the largest shipper is concerned it will continue until stopped by cold weather. This shipper is now sending down the lakes about 50,000 tons of ore daily.

The Steel Corporation are shipping about 10,000 tons a day from the Norrie group and the Tilden, of the Gogebic range, over 15,000 tons from the Mesaba, and the Marquette and Menominee ranges are averaging more than 10,000 tons a day each. Among the mines Norrie and Chapin have passed the 1,000,000-ton point by considerably more than in any preceding year, and Fayal is now up to an even 1,900,000 tons for the season, and is still moving ore at the rate of 5000 tons a day. If the weather holds for a few days longer the mine may make approximately 2,000,000 tons for the season, which commenced in April. Stevenson, Mountain Iron and Mahoning are followers and are not so far behind as might be imagined. The least of them has a record of about 1,300,000 tons. It is almost inconceivable that one mine should ship more in a season than all the mines of Lake Superior sent down so lately as in 1884, and this one mine not opened for a pound of ore, not even known, until 1894.

### The Mesaba Range.

The Minnesota Iron Company have made some very large stripping contracts for their Hibbing mines the past day or two. One of these is the stripping of the Day mine, just north of Hibbing, to the extent of 700,000 yards. This contract was let this morning to the Drake & Stratton Company, who have been the leading stripping firm of the range for some years. In connection with this the company have let an additional contract for stripping the Burt, adjoining the Day, to Winston Bros. & Dear, the firm that commenced work there last spring. This is for about 500,000 yards and is in addition to about 250,000 yards let the same firm some months ago and on which they have been at work all summer. The Burt and Day are the east and west halves, respectively, of the southwest quarter of section 31-58-20. They form one ore body, though mined heretofore separately and owned by different parties. The stripping will make them one immense mine. The combined job now let is the largest earth-work undertaking ever entered upon at one time in the history of iron mining. It means the removal of a total of about 1,500,000 cubic yards of material, and the price, roughly speaking, is probably not far from 28 cents a yard. The Steel Corporation have no other large Mesaba stripping contracts to be let this season. Details of many others that will be carried on during the present season and next summer were printed in this correspondence last week. On the Menominee range the Steel Corporation will strip a small area of overburden from the Dober, and on the Cascade they will strip the Moore. These operations are an indication of the growth of the stripping idea and point to its further extension in other fields than the Mesaba, where conditions will permit.

### The Marquette and Menominee Ranges.

The deep sand shaft of the Cleveland Cliffs Company, at the new Maas mine at Negaunee, which has been hung for some months in the quicksand, is now said to be gaining slowly and the management is said to be much encouraged. The shaft is down about 130 feet and has in the neighborhood of 18 feet more to go before reaching the ledge. The work of sinking this shaft was begun last February and has been in continual progress since that time, day and night. Since April the shaft has made practically no progress until quite lately.

Up to November 15 the Chicago & Northwestern road had handled 4,200,000 tons of ore from their Escanaba docks, of which about three-fourths was from the Menominee range and nearly all the remainder from

the Marquette. In the same period the Chicago, Milwaukee & St. Paul road have shipped to their new docks at Escanaba 1,100,000 tons, all from Menominee points. This makes a total of 4,200,000 tons from the Menominee range to date, and a total shipment of 5,400,000 from the port of Escanaba. Contrary to possibilities of a few weeks ago Escanaba will not be able to pull up alongside Duluth or Two Harbors this year and they may both lead at the close. All these ports will, however, be quite closely bunched for the leadership of shipping ports.

For more than a year the Oliver Iron Mining Company have been surveying along the course of Iron River, near the Riverton group of mines, to get a course for the stream that shall permit the mining of ores lying under it at the least cost and danger from water overhead. The company are now exploring the Miller property and are said to have a large ore body there, as well as in the Riverton. The river will be directed aside in some one of several ways under consideration in order that the large deposits may be mined; whatever way is chosen will mean a large amount of work and will pave the way for years of development. The Eleanor, formerly the Appleton mine, is being developed by new capital and is showing up well. It lies close to Sturgeon River and joins the Loretto mine. Its ore so far as shown is of a Besemer grade. Loretto is working some 300 men, and is developed for many years of mining. At Bristol mine, belonging to Pickands, Mather & Co., they are shipping the last of their stock pile and will mine heavily this winter. At Hemlock, also belonging to Pickands, Mather & Co., they are mining largely and shipping a larger amount of ore than ever before.

### The Gogebic Range.

Cleveland operators have leased the old Winona of the Gogebic range, and will explore it through the shaft of the Jack Pot, recently abandoned by Jones & Laughlins. They have leased the shaft and equipment and will drive a drift into the Winona, as well as sink the Winona shaft itself to greater depth. Winona was nothing but an unsuccessful exploration, but may become a good property. The same company have shipped this year some 22,000 tons from the old Colby, which had been abandoned for years. They entered it from the abandoned shaft of the Valley and sunk a second in Colby ground, and are opening what may be a valuable mine, though so far it is rather narrow. Preparations have been made, however, for a large stock pile this winter, and underground development will be carried on heavily during the season, and it is expected that the old mine will ship another year more ore than for a number of years. At the Iron-ton, another long abandoned mine in the same district taken by the same firm, they are sinking two shafts and will develop extensively this winter. These are an indication of the way in which abandoned portions of the Gogebic are being quietly re-explored and reopened for mining as soon as possible, and it is a fact that some of these newly undertaken operations are proving satisfactory to those having them in charge.

### The Vermillion Range.

On the Vermillion range there will be an immense amount of new exploration this winter. The Mahoning Ore & Steel Company have taken a lot of land between Ely and Section 30 and some more east of the latter section, while the Steel Corporation are working several drills west of there. Others are putting drills in near the Minnesota mine at Tower, and several other important exploration projects, by leading companies of large means and great responsibility, are said to be under consideration.

Michigan School of Mines has received from Thos. F. Cole, president of the Oliver Mining Company, as a gift of that corporation, a check for \$3000 to help along its gymnasium fund. The gift means far more to the school than the mere money value, coming from the source it does. It is a fact that the Oliver Mining Company, the mining end of the United States Steel Corporation, are making for themselves a close and warm friendship with leading mining schools and are forming connections with these schools that will be of the greatest advantage, doubtless, to both sides.

D. E. W.

## The Consolidation of the Malleable Foundries.

CHICAGO, ILL., December 3, 1902.—A dispatch from Detroit announcing the consummation of the consolidation of malleable iron casting interests is verified by an official of a local company. It is expected that the name of the consolidated company will be the American Malleable Castings Company, but other names have been proposed. The capital stock is to be \$20,000,000, as previously announced. It is claimed that 85 per cent. of the malleable output of the country has been secured, the annual capacity of the plants being about 200,000 tons. Chicago will be the headquarters of the operating department, while the financial department will be located in New York City. The merger has been long held in abeyance by the opposition of some of the Milwaukee concerns. It is now understood that all interests have been harmonized. The following is a list of the companies interested in the combination:

Albion Malleable Iron Company, Albion, Mich.  
Beaver Dam Malleable Company and Belle City Malleable Company, Racine, Wis.  
Chicago Malleable Castings Company, West Pullman, Ill.  
Chisholm & Moore Mfg. Company, Cleveland, Ohio.  
Marion Malleable Iron Works, Marion, Ind.  
Michigan Malleable Iron Company, Detroit, Mich.  
Missouri Malleable Iron Company, East St. Louis, Ill.  
Moline Malleable Iron Company, St. Charles, Ill.  
Northwestern Malleable Iron Company, Milwaukee, Wis.  
Pittsburgh Malleable Iron Company, Pittsburgh, Pa.  
Pratt & Letchworth Company, Buffalo, N. Y.  
Ross-Meehan Foundry Company, Chattanooga, Tenn.  
Springfield Malleable Iron Company, Springfield, Ohio.  
Trenton Malleable Iron Company, Trenton, N. J.  
Waukesha Malleable Iron Company, Waukesha, Wis.  
Whiteley Malleable & Castings Company, Muncie, Ind.  
Union Malleable Castings Company, Moline, Ill.

## PERSONAL.

S. L. McDowell, who for a number of years was purchasing agent for the De La Vergne Refrigerating Machine Company of New York, resigned his position last Saturday to associate with Thomas A. Lewis, 120 Liberty street, New York. Mr. Lewis has since the organization of the International Steam Pump Company, represented a number of the more prominent independent pump builders, disposing of the entire product of certain concerns. The business has recently assumed such proportions as to make the acquisition of a man of Mr. McDowell's ability essential. When Mr. McDowell left his old post he took with him two handsome testimonials, one bearing the autographs of the members of the firm and the other the superintendents of the various departments.

Isaac W. Frank, president of the United Engineering & Foundry Company, is in Mexico.

J. Beyers Holbrook, M. E., has been admitted to partnership in the firm of Charles Henry Davis & Partners, 25 Broad street, New York, as their heating and ventilating engineer.

The report that Henry C. Frick would build a university in Pittsburgh to cost \$5,000,000 has been officially denied. Mr. Frick owns a large site of land near where the Carnegie Polytechnic School will be built, but so far Mr. Frick has declined to say for what purposes this land will be used.

Some recent changes have been made by the Chicago Pneumatic Tool Company, Chicago, in their representatives in this country. Geo. A. Barden, who has been representing the company at Buffalo, has been transferred to the Philadelphia field, and C. R. Green, who has been connected with the Cleveland office of the company, has succeeded Mr. Barden in Buffalo. Chas. Parsons, who

recently became connected with the company, is now traveling in the Northwest.

W. O. Jacquette, who has been manager of sales of the Pressed Steel Car Company, at Pittsburgh, has severed his connection with that concern to accept the position of vice-president of the Southern Car & Foundry Company, a controlling interest in which concern was recently acquired by the Standard Steel Car Company of Pittsburgh, with works at Butler, Pa.

John G. A. Leishman, United States Minister to Turkey, and formerly president of the Carnegie Steel Company, is in Pittsburgh this week on his usual annual visit. Mr. Leishman sees great need for railroads and transportation facilities of all kinds in the Ottoman empire and thinks that country a fine field for American investment.

William H. Shipp, formerly superintendent of the foundry at the Lloyd Booth Works of the United Engineering & Foundry Company at Youngstown, Ohio, has resigned his position.

U. G. Wilson, a mechanical engineer in charge of the turbine engine department of the British Westinghouse Electric & Mfg. Company of Sheffield, England, is in Pittsburgh for the purpose of making a thorough study of the workings of the new turbine engine being built by the Westinghouse Machine Company at East Pittsburgh.

J. L. Washburn of Duluth, Minn., has been appointed resident agent of the Iroquois Iron Company of Chicago.

The Howard Quinquennial prize of the Institute of Civil Engineers of Great Britain has been awarded to Robert A. Hatfield of Sheffield, the well-known maker of manganese steel. The prize was awarded thus far to Sir Henry Bessemer in 1877, Sir William Siemens in 1882, Dr. John Percy in 1887, Sir Lowthian Bell in 1892 and Professor H. Bauerman in 1897.

Martin Welsh of Youngstown, Ohio, has been appointed superintendent of the furnace plant being erected at Toledo, Ohio, by Pickands, Mather & Co. of Cleveland. Mr. Welsh has been superintendent of the Sharon furnaces of the Republic Iron & Steel Company.

## Pittsburgh Foundrymen's Association.

The regular monthly meeting of the Pittsburgh Foundrymen's Association was held at 410 Penn avenue, Pittsburgh, on Monday evening, December 1. D. P. Thomas was president and F. H. Zimmers secretary. The following members and visitors were present: Charles W. Winder, George Niehaus, B. D. Fuller, Wencel Bavurka, C. F. Knowlton, Westinghouse Electric & Mfg. Company; S. D. Sleeth, J. A. Schick, Westinghouse Air Brake Company; William Yagle, William Yagle & Co.; C. A. Stroh, American Locomotive Works; H. M. Wilson, R. F. Barker, Taylor, Wilson & Co.; Jacob Lane, Keystone Car Wheel Company; James Saville, D. P. Thomas, Sterritt-Thomas Foundry Company; D. B. Adams, Hydraulic Machine Company; E. Wentz, W. H. Nichols, J. S. Seaman, Seaman-Sleeth Company; C. W. Townsend, S. C. Scott, Thomas Carlin's Sons Company; Daniel Ackerman, Hunt Foundry & Machine Company; James Keegan, George Knotts, United Engineering & Foundry Company; J. S. McCormick, T. E. Malone, J. S. McCormick Company; E. A. Kebler, Mathew Addy & Co.; A. O. Backert, *The Iron Trade Review*; F. H. Zimmers, Union Foundry & Machine Company; E. G. Seaman, E. D. Frohman, S. Obermayer Company; S. H. Stupakoff, the Fuller Company; John McLaren, Phillips & McLaren; Mr. Dunlap, Mackintosh, Hemphill & Co., and Robert A. Walker, *The Iron Age*.

A paper on "Foundry Facings," by T. E. Malone of the J. S. McCormick Company was read, followed by a paper on "Sea Coal," by E. D. Frohman of the S. Obermayer Company. These papers were freely discussed by S. D. Sleeth, E. A. Kebler, B. D. Fuller and others. It was announced that the subject for the January meeting would be "Fan Blowers," and several papers on this subject will be presented. The meeting then adjourned, after which a lunch was served.

## The Iron and Metal Trades.

On the whole, business has quieted down considerably and the general tendency is rather downward. In some branches this finds expression chiefly in the lessening of premiums for prompt delivery, this being notably the case with Foundry Irons and with Structural Material.

Consumption generally falls off in the winter, and this year may not prove an exception. It is certain that some work contemplated has been held back because buyers find the cost too high.

In the present condition of the money markets financing of new projects is not as readily accomplished. The true test of the effect of high prices in checking consumption in some important departments will only come as we get further along into the next year. It is only then that the mass of consumers will have to confront the situation, since a large part of the material, like Foundry Iron, which has thus far been melted stands in much less than the prevailing rates.

In many branches of the Finished Iron trade the action of the United States Steel Corporation in steadily resisting any advance, like in Rails, Structural Material and Plates, has kept values within bounds. In others, as in Wire, Sheets, Tin Plate and Tubes, the readjustments during the past few months have put prices on a fairer level.

Up to a certain point the high cost and scarcity of raw materials are restricting the production of finished materials on the part of the outside mills who must depend upon the open market for Pig Iron and Steel. Under the circumstances a larger proportion of the work placed goes to the large concerns who control their own raw materials.

The advances in freight rates are adding to the cost to the consumers.

It is felt in the Iron trade that prices of domestic Pig Iron must be gradually brought back to the point where importations are cut off, but the fact must be taken into account that any cessation of buying from here will cause weakening abroad and thus establish a new price level. Already this has developed in the case of Middlesbrough No. 3 Foundry, which can be laid down now at \$18, cash, ex-ship, duty paid, as compared with the maximum of \$19 to \$19.25 some time since. Foreign Iron not alone virtually controls the tidewater market, but is reaching far into the interior.

Only moderate quantities of foreign Steel Billets have been sold lately, chiefly because the rolling mills cannot afford to pay the prices current, and convert the Steel at a profit into finished goods at the present lower range.

Some further good orders have been placed in the East and West for Structural Material, and Chicago notes a fairly large order for Plates. The Western outside makers of Bars have been discussing the question of a consolidation and have nearly succeeded in effecting it. Competition in the Sheet trade continues quite active.

## A Comparison of Prices.

### Advances Over the Previous Month in Heavy Type, Declines in Italics.

At date, one week, one month and one year previous.

	Dec. 3, 1902.	Nov. 27, 1902.	Nov. 5, 1902.	Dec. 4, 1901.
<b>PIG IRON:</b>				
Foundry Pig No. 2, Standard, Philadelphia .....	\$23.00	\$23.50	\$22.50	\$15.50
Foundry Pig No. 2, Southern, Cincinnati .....	22.25	22.25	22.25	14.25
Foundry Pig No. 2, Local, Chicago .....	23.00	23.00	23.00	15.50
Bessemer Pig, Pittsburgh .....	21.75	21.75	21.50	16.00
Gray Forge, Pittsburgh .....	20.50	20.75	21.50	14.75
Lake Superior Charcoal, Chicago .....	26.00	26.00	26.00	17.50
<b>BILLETS, RAILS, ETC.:</b>				
Steel Billets, Pittsburgh .....	29.00	28.50	29.00	28.00
Steel Billets, Philadelphia .....	*26.75	*26.00	*27.00	28.00
Steel Billets, Chicago .....	*29.50	*29.50	*29.00	....
Wire Rods, Pittsburgh .....	34.50	35.50	35.50	35.00
Steel Rails, Heavy, Eastern Mill .....	28.00	28.00	28.00	28.00
<b>OLD MATERIAL:</b>				
O. Steel Rails, Chicago .....	18.75	18.75	19.00	14.00
O. Steel Rails, Philadelphia .....	21.00	21.00	21.50	17.50
O. Iron Rails, Chicago .....	24.50	24.50	25.00	21.00
O. Iron Rails, Philadelphia .....	24.00	24.00	24.50	21.50
O. Car Wheels, Chicago .....	24.00	24.00	24.00	15.50
O. Car Wheels, Philadelphia .....	20.00	20.00	21.00	16.25
Heavy Steel Scrap, Pittsburgh .....	21.00	21.00	21.00	....
Heavy Steel Scrap, Chicago .....	18.50	18.50	18.50	13.50
<b>FINISHED IRON AND STEEL:</b>				
Refined Iron Bars, Philadelphia .....	1.92½	1.92½	1.85	1.65
Common Iron Bars, Chicago .....	1.75	1.75	1.75	1.65
Common Iron Bars, Pittsburgh .....	1.70	1.70	1.80	1.55
Steel Bars, Tidewater .....	1.75	1.75	1.72	1.70
Steel Bars, Pittsburgh .....	1.60	1.60	1.60	1.50
Tank Plates, Tidewater .....	2.10	2.10	2.10	1.75
Tank Plates, Pittsburgh .....	1.85	1.85	1.85	1.60
Beams, Tidewater .....	2.00	2.00	2.00	1.75
Beams, Pittsburgh .....	2.00	2.00	2.10	1.60
Angles, Tidewater .....	2.00	2.00	2.00	1.75
Angles, Pittsburgh .....	1.95	1.95	2.00	1.60
Skelp, Grooved Iron, Pittsburgh .....	1.92½	1.92½	1.95	1.80
Skelp, Sheared Iron, Pittsburgh .....	2.05	2.05	2.05	1.85
Sheets, No. 27, Pittsburgh .....	2.65	2.65	2.65	2.90
Barb Wire, f.o.b. Pittsburgh .....	2.45	2.45	2.45	2.90
Wire Nails, f.o.b. Pittsburgh .....	1.85	1.85	1.85	2.05
Cut Nails, Mill .....	2.05	2.05	2.05	2.05
<b>METALS:</b>				
Copper, New York .....	11.50	11.25	11.62½	16.50
Spelter, St. Louis .....	4.82½	4.87½	5.15	4.20
Lead, New York .....	4.10	4.10	4.10	4.37½
Lead, St. Louis .....	3.97½	3.97½	4.00	4.25
Tin, New York .....	24.75	24.25	26.12½	24.50
Antimony, Hallett, New York .....	7.25	7.25	7.75	8.37½
Nickel, New York .....	40.00	40.00	40.00	60.00
Tin Plate, Domestic, Bessemer, 100 pounds, New York .....	3.79	3.79	3.79	4.19

\* Foreign.

## Chicago.

FISHER BUILDING, December 3, 1902.—(By Telegraph.)

While the market for Pig Iron has been giving occasional exhibitions of an erratic temper, with a wide variation of prices, the general tendency has been toward a more settled condition and a lower basis. Especially is this true of Iron for December delivery, but it has also been evident to a less degree in deliveries for the first two quarters of 1903. The conditions bringing about this change of sentiment are noted elsewhere. There has been more activity during the week, and it is expected that a larger volume of business will be transacted soon after the first of the year. The Bar Iron market has been less erratic, with a narrower range in the prices current. The only important feature in Structural Material is that some of the independent mills are in position to make deliveries within 60 days, and this fact has detracted from the demand for shipment from local stocks, upon which high premiums have been demanded. Plates have continued as strong as ever, with some important tonnage placed for next July. There has been a better movement in Billets, with some liberal sales of foreign material, and considerable more business pending. There has also been a better demand for small quantities of domestic Billets and Wire Rods. The weakness in Sheets, Merchant Pipe and Boiler Tubes has been more apparent during the week, keen competition resulting in concessions by those in interest. There has been a better movement in Merchant Steel and a continued demand for Light Rails and Standard Sections from electric roads, and there is a rumor of one large contract pending by a trunk line. Old Material, at least such kinds as are used by Open Hearth furnaces, continues scarce and strong.

There is also a good demand for Cast Scrap, but the grades used principally by the rolling mills have shown a further tendency downward.

**Pig Iron.**—Several large buyers largely dependent upon local iron, either attracted by the lower prices or forced to purchase from necessity, have been in the market during the last week for spot and December iron in relatively large quantities. In all about 6000 tons have been sold, including Nos. 1, 2 and 3 Foundry, Nos. 1 and 2 Soft and a small quantity of Mill grades. Prices have been based on \$21 to \$22, Birmingham, or \$25.15 to \$26.15, Chicago, for No. 2 Foundry. Among the largest buyers have been agricultural implement and machinery manufacturers and stove and other heating apparatus foundries. Forge iron has been purchased as usual principally by rolling mills. Malleable iron foundries have also been pressed into the market for quick supplies, and transactions have been made aggregating several thousand tons in lots of 100 to 300 tons, for December delivery, at prices ranging from \$24.75 to \$25.50, Chicago, the outside price being for strictly spot iron. Large pipe interests have purchased liberally, estimated between 10,000 and 15,000 tons, of foreign iron during the past ten days for their Western foundries. Some Southern producers have personally investigated the local market during the week, and it is now evident that there is a sentiment among Southern furnacemen favorable to lower prices for early delivery iron. This attitude has no doubt been taken upon recognizing the inroads that foreign iron is making into the territory of domestic supply, not only on the Atlantic seaboard, but in the Central West. Southern iron is already shut out of the Eastern markets, and with the resumption of local furnaces within the next 30 days their market in this territory will be curtailed, and they will be further handicapped by the advance in freight rates of 75c. per ton north of the Ohio River, in effect the first of the year. Local producers are still idle for lack of ample fuel supply, but active preparations are making for resumption in the near future. With cotton moving more freely in the South, the shortage of cars is felt more keenly by the furnaces, but even so, deliveries upon contracts have been much larger recently, and with more cars available a much larger quantity would have been moved during the past two weeks. Important furnaces are accumulating stocks at furnace yards. There has been a general impression that all Southern companies are so heavily sold that they would carry over large orders into next year which should have been delivered during 1902. It is now asserted that the largest Southern interest will carry over 130,000 tons into the next year, but the next two largest companies claim they will carry over all told scarcely 30,000 tons, and if cars are available practically nothing. This indicates that the position of the pig iron market is much better than has been anticipated and as reflected in the wild market and erratic prices that have prevailed for several months. Even now prices are irregular, but there is a steady tendency, as previously noted, toward a more settled condition and lower prices not only for immediate delivery, but for the first and second quarters of next year. Several large buyers, it is learned, have contracted nothing for next year and must soon enter the market for domestic or purchase foreign iron. Some sales have been made for both the first and second quarters of next year on the basis of \$20 for No. 2 Foundry for the first half, \$19 for the second quarter, and \$18 for No. 3 for the second quarter. Measured by ordinary standards, the market during the week has been quiet, but sales would probably aggregate both for December and next year's delivery fully 20,000 tons, exclusive of foreign iron. There have been larger sales of High Silicon iron, ranging from \$26.15 to \$29.15 for prompt delivery, according to percentage. Charcoal iron is still very scarce, and there is a great demand for Old Car Wheels as a substitute. Malleable Bessemer is also almost impossible to obtain for immediate delivery. The following are the prices current for the first six months of 1903:

Lake Superior Charcoal.....	\$26.00 to \$27.00
Local Coke Foundry, No. 1.....	23.50 to 24.00
Local Coke Foundry, No. 2.....	23.00 to 23.50
Local Coke Foundry, No. 3.....	22.50 to 23.00
Local Scotch, No. 1.....	24.00 to 24.50
Ohio Strong Softeners, No. 1.....	27.50 to 28.00
Southern Silvery, according to Silicon.....	25.15 to 29.15
Southern Coke, No. 1.....	23.65 to 24.15
Southern Coke, No. 2.....	22.65 to 23.15
Southern Coke, No. 3.....	22.15 to 22.65
Southern Coke, No. 1 Soft.....	24.15 to 24.65
Southern Coke, No. 2 Soft.....	23.15 to 23.65
Foundry Forge.....	22.15 to 22.65
Southern Gray Forge.....	19.65 to 20.15
Southern Mottled.....	19.15 to 19.65
Southern Charcoal Softeners, according to Silicon.....	27.15 to 27.65
Alabama and Georgia Car Wheel.....	29.15 to 29.65
Malleable Bessemer.....	24.00 to 24.50
Standard Bessemer.....	23.00 to 23.50
Jackson County and Kentucky Silvery, 6 to 8 per cent. Silicon.....	28.00 to 30.00

**Bars.**—As a rule, the market for Bar Iron has continued very slow, but with some of the mills closed down temporarily and the prospect of a better understanding among independent interests the mills which have been hungry for orders have shown less disposition to accept orders under

1.75c., base, Chicago. Most of the specifications which have been accepted have been taken on this basis. There has been further specifying on old contracts for Steel Bars and some improvement in the amount of new business offered. Hoops and Bands have continued quiet. The following are the prices current: Soft Steel Bars, 1.75c. to 1.80c.; Hoops, 2.15c. to 2.25c.; Angles, 1.85c. to 1.90c., base, mill shipments. The demand from store has been light, and prices have been nominally unchanged as follows: Bar Iron selling at 2.15c.; Soft Steel Bars, 2c. to 2.25c.; Angles at 2.50c., and Hoops at 2.40c., base, from store.

**Structural Material.**—But few, if any, large contracts have been offered during the week, and there is less pressure on the mills, some of the independent producers being able to accept contracts for delivery within the next 60 days. This has thrown some business which heretofore has been supplied from local stocks at a premium to the mills for delivery during the next two months on the minimum. There has been more inquiry for foreign material, and several lots of a few hundred tons each have been placed during the last ten days. For domestic Steel, mill shipment, prices are as follows: Beams, Channels and Zees, 15 inches and under, 1.75c. to 1.90c.; 18 inches and over, 1.85c. to 2c.; Angles, 1.75c. to 1.90c. rates; Tees, 1.80c. to 1.90c.; Universal Plates, 2c. to 2.25c. The outside prices represent the premium demanded for very early delivery. As previously indicated, the demand for small lots from local stocks has fallen off materially incidental to lateness of the season, and also to the fact that some mills are prepared to make prompt shipments at official prices. The following are the prices current from local stocks: Beam and Channels, 2.50c. to 3c.; Angles, 2.50c. to 3c., and Tees at 2.55c. to 3.50c. at local yards.

**Plates.**—The situation is unchanged, strength being the most important feature of the market, with sales of 15,000 tons for delivery in July, 1903. The following are the prices current: Tank Steel,  $\frac{1}{4}$ -inch and heavier, 1.75c. to 2.10c.; Flange, 1.85c. to 2.10c.; Marine, 1.95c. to 2.20c. There has been less inquiry for small lots from local yards, but stocks are light and full prices are readily obtained, as follows: Tank steel,  $\frac{1}{4}$ -inch and heavier, 2.25c. to 2.50c.; Tank Steel, No. 8, 2.35c. to 2.55c.; Flange, 2.50c. to 2.65c., all f.o.b. warehouse, Chicago.

**Sheets.**—The situation is unsatisfactory alike to producers and consumers. Offerings are free and the market is weak, with keen competition resulting in further cutting of the official prices. The following are the prices current for Black Sheets, mill shipment, carload lots, f.o.b. Chicago: No. 20, 2.55c. to 2.60c.; Nos. 22 and 24, 2.60c. to 2.70c.; No. 26, 2.70c. to 2.80c.; No. 27, 2.80c. to 2.90c.; No. 28, 2.90c. to 3c. No improvement is noted in the market for Galvanized Sheets, a discount on the base price of 75 and 10 per cent. being readily made. The following are the net prices: No. 27, 3.25c. to 3.50c. for mill shipment, and small lots from store at 3.40c. to 3.65c., Chicago.

**Cast Pipe.**—The foundries are pretty well caught up on orders for small sizes, and there being few large contracts offering, as usual at this season, with an easier feeling in pig iron, the market for pipe is also easier, and concessions of 50c. per ton would be granted in special cases, but for the time being prices on small lots continue as follows: 4-inch, \$37; 6-inch, \$36; 8-inch and upward, \$35; Gas Pipe, \$1 per ton higher, f.o.b. Chicago.

**Billets.**—There has been further activity in foreign steel, sales of about 5000 tons having been made on Chicago account in the East at prices ranging from \$26.50 to \$27, duty paid, delivered on the Atlantic seaboard. Prices delivered at Chicago and other Western points vary according to analysis and size of Billets, ranging from \$29.50 to \$30.50, with sales of about 1500 tons at the outside price. Small lots of foreign Forging Billets have also been sold at \$37, delivered. There has been a good inquiry for domestic Billets, but mainly for small lots ranging from carloads to 100 tons for early shipment, prices ranging for Open Hearth from \$36 to \$40, according to analysis, buyer and time of delivery. Re-rolling Billets are still quotable at \$31 to \$32, mill shipment, Chicago. For small lots a premium is asked and obtained.

**Merchant Pipe.**—The more settled feeling, which seemed apparent last week, has given place to an unsettled condition with as keen or keener competition than ever and with larger discounts made by nearly all parties of interest. The market has been very quiet, with the exception of one or two contracts of moment, one of which was placed last week and two of which are still pending. The independent mills are cutting jobbers' discounts made by the largest interest fully 5 per cent., and in some cases even greater discounts have been allowed. The following are the current base discounts, net, random lengths, for mill shipment, f.o.b. Chicago, carloads only:

	Steel Pipe.		Guaranteed Wrought Iron.	
	Black.	Galvd.	Black.	Galvd.
	Per cent.	Per cent.	Per cent.	Per cent.
$\frac{1}{4}$ to $\frac{3}{4}$ inch.....	69 $\frac{1}{2}$	56 $\frac{1}{2}$	63 $\frac{1}{2}$	53 $\frac{1}{2}$
$\frac{1}{2}$ inch.....	68 $\frac{1}{2}$	58 $\frac{1}{2}$	65 $\frac{1}{2}$	55 $\frac{1}{2}$
$\frac{3}{4}$ to 6 inches.....	73 $\frac{1}{2}$	63 $\frac{1}{2}$	70 $\frac{1}{2}$	60 $\frac{1}{2}$
7 to 12 inches.....	71 $\frac{1}{2}$	61 $\frac{1}{2}$	68 $\frac{1}{2}$	58 $\frac{1}{2}$

**Boiler Tubes.**—A slow and weaker market has been experienced during the week, although prices have not been essentially changed, the following table of discounts being subject to an additional discount of 5 per cent. for mill shipment:

	Steel.	Iron.
1 to 1½ inches.....	43½	38
1½ to 2½ inches.....	56	36
2½ to 5 inches.....	61	46
6 inches and larger.....	56	36

The trade from store has resulted in the making of discounts in addition to those arranged in the following schedule, in some cases as much as 5 per cent. being granted:

1 to 1½ inches.....	35	35
1½ to 2½ inches.....	47½	32½
2½ to 5 inches.....	55	42½
6 inches and larger.....	47½	..

**Merchant Steel.**—There has been some little increase in the demand for Machinery Steel, Tire and Shafting Steel for early delivery and a moderate trade in other kinds, the market remaining steady. Competition is more apparent in Tool Steel. For mill shipment prices are as follows: Smooth Finished Machinery Steel, 2c. to 2.10c.; Smooth Finished Tire, 1.95c. to 2.10c.; Open Hearth Spring Steel, 2.65c. to 2.75c.; Toe Calk, 2.25c. to 2.40c.; Sleigh Shoe, 1.85c. to 1.90c.; Cutter Shoe, 2.40c. to 2.60c.; Cold Rolled Shafting, 47 off in carload lots and 42 off in less than car lots. Ordinary grades of Crucible Tool Steel are quoted at 6c. to 7c. for mill shipment; specials, 12c. upward.

**Rails and Track Supplies.**—There was a rumor current that another trunk line was in the market for 50,000 tons of Rails. This seems doubtful, however, as the largest domestic producers were not even asked to make quotations, and as the mills are so well sold for almost the entire year of 1903 such business, if any, must go to foreign producers. The demand from electric roads has continued active, and in the aggregate for a considerable amount, but sales have been few. The demand for Light Rails has been as urgent as ever, with sales of 2000 tons on the basis of quotations for early delivery. There has also been some inquiry for foreign Rails, with sales of 1400 tons of 60-lb. Rails for delivery on the Atlantic seaboard at about \$32.50, c.i.f., duty paid. Official prices for domestic Rails continue unchanged at \$28 for standard and \$27 for second quality, mill shipment. Light Sections continue to sell from \$35 to \$45, according to weight. Track Supplies have continued to sell readily at the following prices: Splice Bars or Angle Bars, 2c.; Spikes, 2.50c.; Track Bolts, with Hexagon Nuts, 3.10c. to 3.45c.; Square Nuts, 2.95c. to 3.10c.

**Old Material.**—For heavy material, both Iron and Steel, the market has continued firm. Cast Scrap only has been in good demand and stronger, but such grades as are purchased by rolling mills, as Railroad Wrought, Busheling, Turnings and Borings, have developed a still weaker feeling because of the holding off of the rolling mills. Old Car Wheels and Old Rails are especially scarce and strong, with prices little better than nominal in the absence of important trading. The following are the prices current per gross ton, Chicago:

Old Iron Rails.....	to \$24.50
Old Steel Rails, mixed lengths.....	\$18.75 to 19.00
Old Steel Rails, long lengths.....	23.50 to 24.50
Heavy Relying Rails.....	32.00 to 32.50
Old Car Wheels.....	24.00 to 25.00
Heavy Melting Steel Scrap.....	18.50 to 18.75
Mixed Steel.....	15.50 to 16.00

The following quotations are per net ton:

Iron Fish Plates.....	to \$22.00
Iron Car Axles.....	\$24.50 to 25.00
Steel Car Axles.....	23.50 to 24.00
No. 1 Railroad Wrought.....	20.50 to 21.00
No. 2 Railroad Wrought.....	18.00 to 18.50
Shafting.....	20.00 to 21.00
No. 1 Dealers' Forge.....	16.50 to 17.00
No. 1 Busheling and Wrought Pipe.....	14.50 to 15.00
Iron Axle Turnings.....	to 15.00
Soft Steel Axle Turnings.....	14.50 to 15.75
Machine Shop Turnings.....	to 14.00
Cast Borings.....	10.25 to 10.75
Mixed Borings, &c.....	10.50 to 11.50
No. 1 Bollers, cut.....	14.50 to 15.00
Heavy Cast Scrap.....	17.50 to 18.00
Stove Plate and Light Cast Scrap.....	14.00 to 14.50
Railroad Malleable.....	16.25 to 16.75
Agricultural Malleable.....	16.00 to 16.25

**Metals.**—The market for Copper has been dull and heavy with lower prices ruling, and at the close is slow. Lake being quoted at 11¼c. in carload lots and 11½c. to 11¾c. in a jobbing way. Pig Lead has remained firm with a fair demand at 4.05c. in 50-ton lots, 4.07½c. in carload lots, and 4.10c. in a jobbing way. Sheet Zinc has been quiet and lower at 6¼c. in less than carload lots. Old Metals have been dull and weak in sympathy with the market for Ingots. Local dealers have sold in a moderate way during the week as follows: Heavy Cut Copper, 10¼c.; Red Brass, 10¼c.; Copper Bottoms, 9¼c.; Lead Pipe, 3.90c.; Zinc, 3.80c.

**Coke.**—There has been little change in the market for Foundry Coke, single car lots, spot, being in the neighborhood of \$10 per ton on track, Chicago, and offerings for next year's delivery are light. Furnace Coke has been sold for the first half of 1903 at prices ranging from \$4.25 to \$4.75 at the

ovens. Pocahontas Coke has been sold for December delivery at \$5 cash at the ovens. As a rule, furnaces in this section are holding off from making contracts for next year's delivery, anticipating lower prices within the next 60 days.

## Philadelphia.

FORREST BUILDING, December 2, 1902.

The market is a shade easier than it was a week ago and the demand not particularly active. The chief reason for this is the ample supplies of foreign Iron and the comparatively low prices at which it can be bought. Sellers try to get as near to the prices for American Iron as they can, and as the quality is in most cases satisfactory, there is no reason for not doing so when new purchases are a necessity. The cost of handling is considerable, and as the majority of buyers want the usual American terms for settlement importers are compelled to name what appear to be high figures. Cargo lots of fair to good Iron can be imported at \$19 to \$20, c.i.f., but spot cash is required, so that in jobbing it out on American terms \$1 to \$2.50 per ton is little enough to cover interest, risks and incidental expenses. The fact that there are reserves of this kind to fall back upon prevents inordinate anxiety to buy domestic Iron at quoted rates, the idea being that if just what is wanted cannot be had substitutes can be found at reasonable prices. Moreover, the close of the year is approaching, and so long as immediate wants can be supplied there is a more or less pronounced feeling of indifference in regard to new engagements; consequently no great activity is expected during the next few weeks. Besides recent arrivals, there are several 3000 to 5000 ton cargoes due to arrive at this port before the holidays, so that even if the local furnaces do not increase their output there will be pretty fair supplies of other Irons. In addition to cargoes of Pig Iron above mentioned, there was one of 4000 tons of Crop Ends, besides a considerable tonnage of Blooms, Billets, Sheet Bars, &c., so that between foreign stock and a larger home production there should be plenty of material during the winter months. There has been no great improvement in fuel or transportation so far, but easier conditions are supposed to be in sight, and it is believed that there will be nothing to retard a moderately full production after the turn of the year. How it will affect prices is not clear at the present time, but the situation will be nearer to normal than it has been for months past. Meanwhile Pig Iron has not the aggressively strong appearance that characterized it recently, and the indifference of buyers may lead to recessions, but there are too many uncertainties to warrant very confident predictions.

**Pig Iron.**—The general report of the market is that it is dull and prices slightly easier. The holiday season is at hand, prices are high, prospects of larger supplies are improving, so that there is nothing to encourage purchases in advance of requirements. There is very little American Iron for sale, however, and if it were not for foreign Iron prices would be a great deal higher than they are. The arrivals from Europe are growing larger, however, and with cargoes being shipped almost daily, the chances are that they will effectually check any movement toward higher prices and may pull them down \$1 or \$2 per ton, although that will depend a good deal on the condition of the American furnaces. With better railway facilities and better supplies of Coal and Coke the output of Pig Iron should be largely increased, and prices will rule accordingly. Foreign Iron has been worked in so quietly and with such good management that it will be a hard fight to displace it. It is already from \$1 to \$2, and at some points nearly \$3, below the price of American Iron, so that it will require sharp cuts to displace it. The New England trade have had special advantages by importing via Boston and Portland. One large concern are said to have bought an excellent grade of Foundry Iron at \$21.50, delivered in their yards, and it can be bought alongside ship at \$1 less for spot cash; so that there is little chance for American Iron at prices beyond those now ruling. Moreover, a good deal of Iron is being distributed from the Southern furnaces. Owing to shortage in cars during October and November large quantities of Pig were piled on furnace banks, and as cars are now moderately plentiful, deliveries from this source are easier than they have been for months past. The combination of circumstances above noted has a tendency to check operations temporarily, although the extreme high figures recently quoted are not as frequent as they were three or four weeks ago. There is a probability, therefore, that the market will adjust itself in accordance with the conditions likely to prevail after the turn of the year, but what these conditions will be is not clear at the present moment, although it looks like easier, if not lower, prices before heavy buying begins again. The following are fair average prices for deliveries in buyers' yards, city or nearby points. Cargo lots of foreign, however, could be done at \$1 or \$2 less, c.i.f., duty paid:

No. 1 X Foundry.....	\$25.00 to \$26.00
No. 2 X Foundry.....	23.00 to 24.00
No. 2 Plain.....	22.50 to 23.00
Gray Forge.....	21.00 to 21.50
Middlesbrough.....	21.50 to 22.00
Scotch.....	23.00 to 24.50

**Billets.**—New business seems to be in abeyance temporarily, but arrivals here and in Baltimore have been heavy during the past ten days and are likely to continue so during the remainder of the year. Prices are variously quoted at from \$26.75 to \$27.50, according to quantity and terms of payment. American Steel is nominal at about \$31, but most of the business is for small lots of special Steel at \$33 to \$35. Foreign Sheet Bars are quoted at about \$28 in 1000-ton lots to first-class buyers.

**Plates.**—There is plenty of business, but mills are so far behind with their orders that it is difficult to get any large quantities before February or March. Fuel and transportation are still unsatisfactory, and it is extremely difficult to make a fair output. Prices are very firm, but unchanged, as follows: Small lots, 2.10c. to 2.15c.; carload lots, 1/4-inch and thicker, 2c. to 2.05c.; Universals, 2c. to 2.05c.; Flange, 2.10c. to 2.20c.; Fire Box, 2.25c. to 2.30c.; Marine, 2.30c. to 2.35c.

**Structural Material.**—The demand is fairly large, but deliveries can be had with reasonable promptness, and as a rule without having to pay fancy prices. Ordinarily 1.85c. to 1.95c. will be accepted for anything deliverable after the turn of the year, but for this month 2c. to 2.25c. might have to be paid for special sizes.

**Bars.**—The demand is about what might be expected at this season of the year, neither good nor bad, just small lots to tide over into next month. Prices are well maintained, but that is due more to the "gentleman's agreement" than to any activity in the demand. Steel Bars can be had at 1.75c. to 1.85c. for carload lots as a minimum, and about 2c. for smaller lots. Large sizes are scarce and command an extra price for early deliveries.

**Sheets.**—There is a very good demand for small lots and mills have about all they can do to keep up with their deliveries. No specially large orders are around, however, as there is now a general disposition to await the course of events until the new year begins. Stocks are evidently very light, as those who buy want prompt shipments. Prices fairly steady at unchanged figures.

**Old Material.**—Very little demand at present and buyers are making low bids, as they are not likely to require deliveries until after the holidays. Bids and offers are about as follows for deliveries in buyers' yards:

Old Steel Rails.....	\$21.00 to \$21.50
Heavy Steel Scrap.....	20.50 to 21.00
Low Phosphorus Scrap.....	26.50 to 27.50
Old Steel Axles.....	25.00 to 26.00
Old Iron Rails.....	24.00 to 25.00
Old Iron Axles.....	29.00 to 30.00
Old Car Wheels.....	20.00 to 21.00
Choice Scrap, R. R. No. 1 Wrought.....	22.00 to 23.00
Country Scrap.....	20.00 to 21.00
Machinery Scrap.....	19.50 to 20.00
No. 2 Light Scrap.....	17.00 to 18.00
No. 2 Light (Ordinary).....	14.50 to 15.00
Wrought Turnings.....	16.00 to 16.50
Wrought Turnings, Choice Heavy.....	17.00 to 17.50
Cast Borings.....	10.00 to 10.50
Stove Plate.....	14.00 to 15.00

## Cincinnati.

FIFTH AND MAIN STS., December 3, 1902.—(By Telegraph.)

There is but very little doing in Pig Iron just at present. The demand is largely for small lots and at hardly any point is it equal to the offerings. Though here and there a buyer is placing orders for future supply, yet, on the whole, they are manifesting a disposition to wait before contracting for their needs. This is so especially for last half deliveries. The general problem of transportation which underlies the Coke situation is not an encouraging factor and is having considerable weight in making the Pig Iron market dull and in a limited sense weak. Prices have not materially changed within the past week, but what shifting there has been has been downward. It is reported that some furnaces, while still nominally holding on the basis of \$20 for spot delivery, No. 2 Foundry, Birmingham, are advancing Iron sold on \$19 basis for next year to customers for this month's shipment. The lower grades are still the weaker part of the price-list. The outlook is for continued dullness, with moderate declines for some weeks at least to come. Freight rate from the Hanging Rock district \$1.10, and from Birmingham to Ohio River points \$3.25. We quote, f.o.b. Cincinnati, for 1902 delivery, as follows:

Southern Coke, No. 1.....	\$24.25 to \$26.00
Southern Coke, No. 2.....	23.25 to 25.00
Southern Coke, No. 3.....	21.50 to 23.00
Southern Coke, No. 4.....	19.00 to 20.00
Southern Coke, No. 1 Soft.....	24.25 to 26.00
Southern Coke, No. 2 Soft.....	23.25 to 25.00
Southern Coke, Gray Forge.....	19.00 to 20.00
Southern Coke, Mottled.....	19.00 to 20.00
Ohio Silvery, No. 1.....	30.10 to 32.10
Lake Superior Coke, No. 1.....	26.10 to 26.60
Lake Superior Coke, No. 2.....	25.10 to 25.60
Lake Superior Coke, No. 3.....	24.10 to 24.60

## Car Wheel and Malleable Irons.

Standard Southern Car Wheel.....	\$28.25 to \$29.25
Lake Superior Car Wheel and Malleable.....	27.50 to 28.50

Quotations for 1903 shipment, freight rates only guaranteed to March 1, are as follows, f.o.b. Cincinnati:

Southern Coke, No. 1.....	\$22.75 to \$24.00
Southern Coke, No. 2.....	22.25 to 23.25
Southern Coke, No. 3.....	21.25 to 22.25
Southern Coke, No. 4.....	20.00 to 21.00
Southern Coke, Gray Forge.....	20.00 to 21.00
Southern Coke, Mottled.....	20.00 to 21.00
Southern Coke, No. 1 Soft.....	22.75 to 24.00
Southern Coke, No. 2 Soft.....	22.25 to 23.25
Lake Superior Coke, No. 1.....	26.10 to 26.60
Lake Superior Coke, No. 2.....	25.10 to 25.60
Lake Superior Coke, No. 3.....	24.10 to 24.60

## Car Wheel and Malleable Irons.

Standard Southern Car Wheel.....	\$28.25 to \$29.25
Lake Superior Car Wheel and Malleable.....	27.50 to 28.50

**Plates and Bars.**—The situation is rather a dull one and perhaps somewhat weak on present scale of prices. Iron Bars in carload lots, 1.92c., with half extras; same, small lots, 2.20c., full extras; Steel Bars, carload lots, 1.72c., with half extras; same, small lots, 2.20c., full extras. Plates are quoted nominally, 1/4-inch, in carloads, 1.70c.; same, 3-16, 1.80c. As a matter of fact, however, mills having Plates to ship are getting 2.15c. without trouble. I-Beams and Channels, 1.70c., base. All prices f.o.b. Cincinnati.

**Old Material.**—The market is quiet and rather weak. We quote dealers' buying prices, f.o.b. Cincinnati, as follows: No. 1 Wrought Railroad Scrap, \$20 per net ton; Cast Scrap, \$16.50 to \$17 per net ton; Iron Rails, \$24.50 to \$25, gross; Steel Rails, long, \$23.50, gross; same, short, \$18, gross; Iron Axles, \$26.50, gross; Car Wheels, \$21, gross.

## Birmingham.

BIRMINGHAM, ALA., December 1, 1902.

The market is alternately weak and strong. To-day it is the fortune of one seller to obtain \$25 for a small lot he can, by adventitious circumstances, rush, while his neighbor has to be content with the skimmed milk price of \$23.50 for No. 2 Foundry. This grade the past week sold at \$23, \$24 and \$25. But in no instance has there been a sale of magnitude in volume. But there is enough demand to take with avidity what can be had at these varying prices. More could be placed if sellers had it to spare. Spot and nearby Iron is quoted still at buying markets at materially lower prices, but the records of registered sales here will bear out the quotations herein given. It appears that these outside quotations represent more what it is thought the market ought to be, rather than what it really is. As an illustration, a large interest came into the market for 20,000 tons of Gray Forge for first half of 1903 delivery. Everybody had an opportunity to bid for the whole or a part of the lot. But one interest named a price, and that was \$18.50. The offer was not accepted. But the report is out "all the same" that part of the order was accepted at \$15.50 and part at \$15. As No. 4 Foundry was sold at \$19 it does not seem probable that the price quoted as accepted was correct.

For the first half of 1903 the market is on the basis of \$21, but there have been sales as low as \$20 for the second quarter, with some intervening sales between these prices. With the majority of sales certain circumstances are connected, which with the market under normal conditions would have no weight. Your correspondent has seen registered sales of No. 2 Foundry at \$20, deliveries extending from May to October, and is aware that some sales, limited in quantity, have been made at values lower. But this has not been general, and sales below \$20 have not been the rule. Business for this delivery is not active, and the sellers are not going after it. They are willing to let the buyers open the game. It is hard to quote the intermediate grades between Gray Forge and No. 2 Foundry. They are confusingly irregular. It sometimes looks as if buyers were not particular as to grades, but just wanted Iron, on which seller could name price, and guarantee shipment.

Now as to shipments, all that can be said is that there is no improvement. The embargo is as close as it has been heretofore, and there is as yet no relief in sight. Entering an office in search of items, your correspondent was greeted with "We are doing nothing but chasing cars. We can't ship, for we can't get cars, and we have men out tracing up cars so we can get off some shipments, as we are piling up Iron that should be in buyers' hands." The same condition of affairs was found to exist in other offices. The accumulation of stocks in the yards is getting to be an eyesore to the furnace interests, as it locks up a large amount of money, besides encumbering their mail with strenuous complaints that won't be satisfied. It has been stated that the amount of Iron accumulated in the various yards awaiting shipment to impatient owners amounts to fully 50,000 tons. But that is an exaggeration. Probably 30,000 to 35,000 tons will cover the amount awaiting cars for shipment. That is enough to create a serious inconvenience. The railroad people assert that they are doing all they can to ease up the situation, and reports are current of the lease of cars from Northwestern

roads to bring here to move the accumulated business. It is asserted that the road doing the greatest business in the district has not a single engine in reserve. Everything that can haul cars is in service. But all efforts, so far, seem to have made only a faint impression, and if there is any improvement it is apparent only to the railroad people. Those dependent upon them see no rift in the sky yet.

As to Coke, there is no change in the situation. Occasionally one gets caught with a short supply, and cries out for relief, regardless of the price. Under such circumstances \$7 was bid for a lot the past week, and it was furnished as a loan to the amount of 25 cars. The prevailing price the past week was \$6 to \$6.25. But as the weather is changing from good to bad we may expect a stiffening in prices.

The Coal situation has not changed a particle. All shippers are way behind on shipping orders, and their complaints as to insufficiency of cars are unabated. The situation has been and is yet so acute that some interests have difficulty to keep their furnaces going, and some have been compelled to temporarily close their mines, and wait for a better condition of affairs.

The report of the Clearing House for the 11 months of this year is the best ever made by it, as it shows a gain in the clearings for this year of over \$8,000,000, as compared with last year. The deposits in the banks are the heaviest in the history of the city, and are an unimpeachable witness of the plethora of money.

There have as yet been no contracts made by the State for the employment of the convicts, but they will be determined this week. There is sufficient competition to insure a good profit to the State in the final awards.

The Steel mill is continuing to roll Rails, but so far only for their own use. It has been stated that it may be several months before the mill will be seeking business in the general market.

## Cleveland.

CLEVELAND, OHIO, December 2, 1902.

**Iron Ore.**—The Ore shipping season for this year is about over. The hull insurance on vessels will expire December 5, after which date no cargoes will leave the head of the lakes, as the rates are not such as to warrant the vesselmen taking their own risks and the need of the shippers is not sufficient to warrant them in taking the risk or of insuring their own cargoes. The first real spurts of the year came during the past week as far as rates are concerned. The shippers had a few cleaning up cargoes to move and were not in position to quarrel with the vesselmen over freights. The latter had about their own way of it and demanded and received \$1 from the head of the lakes. The rates out of Escanaba were not publicly changed, but there is an understanding that about 90c. to Lake Erie was paid. The Marquette shippers have been practically through with their movement for some time. The shipment during the month of November was much heavier than was generally expected and it is now estimated that the amount moved down the lakes was 2,500,000 tons for the month. That being the case it means a movement of 27,000,000 tons during the year, as the shipments to November 1 had exceeded 24,000,000 tons and there have been fully 500,000 tons moved by the all rail routes. Nothing is being done yet in the way of sales of Ore for next year and the price is not even discussed.

**Pig Iron.**—The situation is stronger in a good many respects than recently reported. The demand is very brisk, especially for quick shipment, and prices have been holding up well. The furnaces are not so easily freed from the effects of the Coke shortage and it seems impossible now that there should be any relief during the present winter. Many of those in the valleys which have been banked for a while are still out of blast. Those who have been watching the situation are not convinced now that it will be easy or even possible to relieve the situation during the entire winter. The railroads are notably short of equipment or have not the operating skill to get what service out of the present rolling stock it seems to permit. Their inability is heightened by inadequate terminal facilities with which to handle the trains when they are made up. There is also an uncertainty as to the supply of Coke itself, which adds to the confusion, as the belief has become general that the Coke ovens cannot supply all of the demand which now exists for that material and that some of it must come from new ovens. In this connection it is interesting to record that a supply of considerable consequence is to be added presently, as there is a movement under way, which, however, is rather indefinite so far, to build extensive ovens along the Cuyahoga River, at Cleveland, with which to supply the new furnaces here and also to enter the merchant trade. They will not come into use soon enough to meet the present demand. The Southern furnaces do not offer any material relief to this territory, as they seem to be as badly tied up as are the furnaces here, and the foreign stocks can be no more depended upon. Foundry Iron is now being

quoted at \$23 for first half delivery, with \$21 for second half. The sales past July 1, however, have been limited and are backward. Southern Iron is quoted at \$20.50 to \$21, Birmingham, for the first half. The Bessemer and Basic situations do not change in the least. There have been reports that sales of Bessemer are pending and it seems possible that something may be done soon, but as yet the association has made no sales past the first quarter of next year. The price quoted is \$23 for Bessemer and \$21 for Basic for first half delivery, all material coming from non-association stacks.

**Finished Iron and Steel.**—The market shows signs of gathering strength this week, or rather a display of strength which existed, but which was doubted a week ago. The reductions which were made in some lines of material led the buyers to suppose that a similar reduction in other products might be expected. For this reason many of them have withheld their orders pending such decision and are buying only as they need the material. Plates have been the leader again this week, showing greater strength even in the smaller mills, where premiums have been demanded. The downward movement, while perhaps not altogether at an end, has been checked. The smaller mills are now consenting to take some orders for first half delivery at association prices, only a portion of the capacity being reserved for emergency cases, instead of the whole of it, as has been witnessed during the last few months. The larger mills are still receiving inquiries and find that specifications on old contracts are easier to obtain. The larger mills are still holding to the old price of 1.60c., Pittsburgh, for their Plates, and the smaller mills range about 2c. at the mills for what they have to sell for spot shipment. Jobbers are getting 2.25c. for Sheared Plates and 2.50c. for Universal Mill Plates, and the demand for them seems to be fair. In Structural Shapes there has been a steadier buying from the larger mills and deliveries now are more difficult to obtain. As in the Plate trade, there has been a steady specification on old contracts, which has been rather encouraging. The sales have been sharp enough both for immediate delivery and for the future to indicate very strongly that the recent easier condition which has been noted in the market has no unwholesome or dangerous side to it. The smaller mills are now taking orders for future delivery, and while they are withholding some capacity on which they hope to obtain premiums, some of them nevertheless are accepting business at the association price. The big sales have all been made on the basis of 1.60c., Pittsburgh. The smaller mills have been getting between 2c. and 2.50c. for material for quick shipment, while the jobbers have been getting 2.50c. to 3c. out of stock. The Sheet trade does not seem to change. There has been a general expectation that the prices would again be reduced, and this feeling has affected the market, greatly retarding the business which ought to have been done. The trade has not entirely recovered from this belief, and while there is now no immediate prospect that the price will go down again, the trade has not revived. Quotations are unchanged at 3.10c. to 3.25c. out of stock for No. 27, one-pass cold rolled, as a base, and 2.85c. to 2.95c. for the same material in carload lots at the mill. Galvanized Sheets are selling for from 3.70c. to 3.85c. for No. 27 as a base. The Bar Iron trade does not seem to be gathering any strength. The price of Scrap seems to have held the price up, but now that there is a possibility of a decline in that material, the Bar Iron price will probably be readjusted, and it is altogether possible that a reduction will be seen before long. At present the prices vary between 1.70c. and 1.80c., Pittsburgh, some sales having been made on both bases. There has been considerable activity in Billets and Sheet Bars. On the former a range of prices is reported from \$28 to \$30 a ton. Sheet Bars have been stronger and the price has held practically at \$32.

**Old Material.**—The mills this week have displayed a disposition to throw over some of their contracts for Scrap and are seemingly actuated by the belief that the price of this material is to decline soon. Practically no business has been done at the old high prices. Quotations are revised as follows: No. 1 Wrought, \$19, net; Iron Rails, \$27.50, gross; Iron Axles, \$28, net; Cast Borings, \$12, gross; Wrought Turnings, \$16.50, gross; Cast Borings, \$19, net; Car Wheels, \$19, gross; Heavy Melting Steel, \$19, gross; Old Steel Rails, \$20, gross.

## The German Iron Market.

ESSEN, November 19, 1902.

Since our last report there has been no improvement in the Iron market, and, on the contrary, the home consumption has even declined somewhat, while for export prices have receded. An additional feature is the general sense of insecurity as to the continuance of the syndicate. The Düsseldorf Pig Iron Syndicate have been prolonged to the end of 1903, but the renewal of the Siegen Pig Iron Syndicate, which expires at the end of this year, may be

regarded as a failure. Whether the Düsseldorf Syndicate will, under these circumstances, succeed in doing effective work remains to be seen. The Siegen works are in a position from now on to sell freely for next year, while so far as this year's deliveries are concerned, they are still bound to the syndicate. It is possible that before long the Siegen works, after having more fully considered the effect of the decision reached yesterday, may come together again under the pressure of adversity, and may then form a more firmly united organization.

Business is quiet in Iron Ore, the production having been sharply reduced. Minette Ore is occasionally sold for the first half of 1903 at former prices. Spanish Ores, in which there is some business doing, fetched about 15 marks per ton, furnace, in the Rhenish provinces and in Westphalia.

In the Pig Iron market business has been almost entirely suspended on account of the uncertainty of the syndicate question. Prices are: Ten to 12 per cent. Spiegel, 68 to 69 marks; Special Mill Iron, 58 marks, f.o.b. Siegen; Ordinary Thomas Pig Iron, 57.50 marks, f.o.b. consuming works; No. 1 Foundry Iron, 65 marks; No. 3, 61 marks; Bessemer, 65 marks; Luxemburg Mill Iron, 46 to 47 marks; Luxemburg Foundry Iron, 49 marks, f.o.b. furnace.

The Old Material market is active, with prices held firmly at 51 to 52 marks for Heavy Cast Scrap, 42 to 43 marks for Remelting Scrap, 54 to 55 marks for Heavy Open Hearth Scrap, 59 to 60 marks for Railroad Scrap, 59 to 60 marks for Bundled Sheet Scrap, and 62 to 63 marks for Fresh Heavy Scrap.

The Steel Syndicate have, since our last report, reduced prices on all kinds of Steel by 5 marks per ton. Officially, therefore, Basic Ingots and Heavy Blooms are quoted at 77.50 marks; Blooms and Heavy Billets, 82.50 marks; Billets of ordinary dimensions, say about 50 millimeters square, 90 marks, and Slabs, 92.50 marks, with extras for special quality. The lowering in prices has proved an inducement to some consumers to contract for a longer period. Many others, however, have covered only their immediate requirements, and buy from month to month. In different quarters a further reduction in prices of Steel had been proposed, but the syndicate have declared a further lowering as impossible at the meeting which was held day before yesterday. There is some inquiry for Muck Bars, but buyers do not want to pay the prices asked, so that comparatively little business has been done. For good Westphalian Bars 88 to 89 marks is demanded. Siegen Bars cost 90 to 92 marks, f.o.b. mill.

Bar Iron prices have also been reduced by 5 marks per ton and are now held at 110 marks for Steel Bars and 120 marks for Iron Bars. These official prices, however, are frequently cut considerably, and it is probable that the existing weak association will soon throw prices open altogether.

The Beam business has fallen off for the home market quite considerably, in view of the approaching winter season, but work is pretty good, nevertheless, on account of the heavy exports. Larger lots have been sold to the United States. Hoops, Bands and Sheets are officially quoted 5 to 7.50 marks less without bringing about any enlivening of the demand. So far as Plates are concerned, work has been received in Ship Plates, and the unremunerative export work continues. The position of the works, however, cannot be described as being particularly good. Prices are unchanged, at 160 marks for Steel Boiler Plates and 130 to 135 marks for ordinary Tank quality. The home market in Wire is very quiet, and export business is difficult through increased competition of American makers. Ordinary Steel Wire Rods for home consumption cost 120 to 122.50 marks, while Iron Rods are 135 to 137.50 marks. Ordinary Drawn Steel Wire is 132.50 to 137.50 marks and Wire Nails 155 to 160 marks.

The State railroads have placed larger orders for Rails, Sleepers and Track Material, and the long expected specifications for locomotives and cars have been received. In this way the works have better employment for some time to come. It is reported that the management of the Prussian State railroads is considering the question of introducing a heavier Rail section. This would naturally be of the greatest importance to the Rail mills, and would be of value to the State, since the management could certainly buy at much lower figures than are usual in normal times.

During the month the Coke Syndicate have fixed prices for the next year and have declined any lowering for Blast Furnace Coke. The price of 15 marks per ton has been determined upon for the first half of 1903. Compared with former years, the price of Blast Furnace Coke is as follows: 1894, 11 marks; 1895, 11 marks; 1896, 12.02 marks; 1897, 13.87 marks; 1898, 14 marks; 1899, 14.37 marks; 1900 and 1901, 17 marks; 1902 and 1903, 15 marks. The price therefore is still 1 mark higher than it was in the boom years of 1898 and 1899. The price for Foundry Coke for 1900 was 18.50 marks; for 1901, 21.50 marks, and for 1902, 17 marks. This has been lowered to 16 marks per ton for 1903.

## Pittsburgh.

(By Telegraph.)

PARK BUILDING, December 3, 1902.

**Pig Iron.**—The Pig Iron market has been very quiet the past week and the furnaces are still unable to get Coke fast enough. At this writing some eight or ten stacks in the two Valleys are banked and it does not seem that there will be any permanent relief in the Coke situation until next spring. Some foreign Iron is coming into this market, a local Steel concern now getting deliveries on about 60,000 tons of foreign Bessemer bought some time ago. Bessemer Iron for early delivery is quoted at \$22.50 to \$23 at the furnaces. For first six months \$21 to \$21.50 at furnace is quoted. Forge Iron is quiet at \$20.50 to \$20.75 at Pittsburgh. No. 3 Foundry Iron for next year is quoted at about \$22 at furnace.

**Steel.**—The Steel market is firmer and Bessemer Billets are held at about \$29, Pittsburgh. On a large contract for extended delivery a lower price might be made. Open Hearth Billets are \$30 to \$31 for Ordinary Carbons and \$33 to \$34 for High Carbons. Sheet Bars are firmer and are held at \$31 to \$32, makers' mills.

(By Mail.)

The week has been a very quiet one in the Iron trade. Despite the efforts of the railroads to relieve the freight congestion the situation is really very little better. On Monday, December 1, shipments of Coke were good, but to-day practically no Coke has been received by the Valley furnaces. Six or eight stacks are banked at this writing with a probability that others will be down before this week is out. We can note a much better feeling regarding the outlook for next year, and 1903 is expected to be a very satisfactory year.

**Ferromanganese.**—We quote English Ferro at \$50 in large lots and \$52.50 in small lots for any delivery. There is practically nothing doing.

**Muck Bar.**—Demand is dull, and domestic Muck Bar is being offered at \$33 to \$33.50, delivered.

**Spelter.**—Spelter has been offered in this market as low as 5.02½¢, delivered. Consumers are not placing orders, believing that prices will be still lower. In fact, it is predicted that Spelter may go as low as 4½¢.

**Rods.**—The market on Rods is lower, and there is not much demand. We quote Bessemer Rods at \$34.50 to \$35, Pittsburgh.

**Plates.**—Demand for Plates continues heavy, and the mills are pretty well filled for first two or three months, and some of the larger mills for first six months of 1903. Prompt Plates continue to bring up to 2c., Pittsburgh, while for January and February delivery 1.85c. is quoted. Official prices for extended delivery are as follows: Tank Plate, ¼-inch thick and up to 100 inches in width, 1.60c., at mill, Pittsburgh; Flange and Boiler Steel, 1.70c.; Marine, Ordinary Fire Box, American Boiler Manufacturers' Association specifications, 1.80c.; Still Bottom Steel, 1.90c.; Locomotive Fire Box, not less than 2.10c., and it ranges in price to 3c. Plate more than 100 inches wide, 5c. extra per 100 lbs. Plate 3-16 inch in thickness, \$2 extra; gauges Nos. 7 and 8, \$3 extra; No. 9, \$5 extra. These quotations are based on carload lots, with 5c. extra for less than carload lots; terms net cash in 30 days.

**Steel Rails.**—Inquiries aggregating a very large tonnage are in the market, some of the more important roads not yet having covered their requirements for 1903. It looks as though some of the railroads will have to place orders with foreign mills to get deliveries wanted, as domestic mills are sold up so far into 1903. We quote at \$28, at mill, for Standard Sections.

**Sheets.**—A fair amount of tonnage is being placed in Black Sheets, but many of the Sheet mills are still in need of orders and are closed down. It is said that fully 50 per cent. or more of the Sheet capacity in this country is idle at the present time. Prices on Black Sheets are fairly firm, but Galvanized Sheets are being cut more or less and are being sold in many cases lower than our quotations. We quote Nos. 22 and 24 Black Sheets, box annealed, one pass through cold rolls, at 2.45c.; No. 26, 2.55c.; No. 27, 2.65c., and No. 28, 2.75c. For small lots the usual advances are charged. We quote No. 26 Galvanized Sheets at 3.35c., or 75 and 10 off; No. 27, 3.60c., or 75 and 10 off, and No. 28, 3.85c., or 75 and 10 off. All the above prices are f.o.b. at mill.

**Structural Material.**—Bridge work is not as active as it has been, many of the railroads having apparently well covered their requirements for next year. A good deal of work has been placed in the East, but no large contracts have recently been given out in this district. Deliveries on Beams and Channels are a little better, while Angles can be had promptly. Small lots of Beams and Channels for prompt shipment bring 2c. to 2.50c., at mill. Official prices for indefinite delivery are as follows: Beams and Channels, up to 15-inch, 1.60c.; over 15-inch, 1.70c.; Angles,

3 x 2 up to 6 x 6, 1.60c.; Zees, 1.60c.; Tees, 1.65c.; Steel Bars, 1.60c., half extras, at mill; Universal and Sheared Plates, 1.60c. to 1.85c.

**Merchant Steel.**—A fair amount of new business is being placed, and specifications on contracts are coming in at a good rate and keep the mills well filled up. Shafting is not as active as it has been, and Crucible Steel has also fallen off in demand to some extent. We quote: Tire, 2.15c. to 2.25c.; Spring, 2.25c. to 2.35c.; Toe Calk, 2.30c. to 2.40c., base; Sleigh Shoe, 2.15c. to 2.25c. Differentials are as follows: Less than 2000 lbs. of a size and not less than 1000 lbs., 10c. advance; less than 1000 lbs. of a size, 30c. advance; Cold Rolled Shafting is 47 per cent. off in carloads and 42 per cent. in less than carloads delivered in territory east of the Mississippi and north of the Ohio rivers. Tool Steel is 6½c. to 10c. for ordinary grades and 12c. and upward for special grades.

**Bars.**—One of the largest makers of Steel Bars in this district has placed an order with a local mill for 10,000 tons to be rolled during the next two or three months. A moderate tonnage is being placed in Steel and Iron Bars, and specifications on contracts are coming in quite freely. The feeling in Bars is considerably better than it has been, and the outlook for next year is regarded as very satisfactory. Prices of Steel Bars are firmly held at 1.60c., but on Iron Bars 1.70c. is being named for carloads and larger lots. We quote Iron Bars at 1.70c. in carloads and 1.75c. to 1.80c. in small lots, f.o.b. Pittsburgh, half extras, as per National card. We quote Steel Bars at 1.60c., at mill. All specifications for less than 2000 lbs. of a size subject to the following differential extras: Quantities less than 2000 lbs., but not less than 1000 lbs., 0.10 per lb. extra. Quantities less than 1000 lbs., 0.30 per lb. extra, the total weight of a size to determine the extra regardless of length.

**Skelp.**—The market continues dull and prices are weak. We continue to quote Grooved Iron at 1.92½c. to 1.95c., and Sheared at 2.05c., Pittsburgh.

**Boiler Tubes.**—The heavy consumers of Boiler Tubes have pretty well covered their requirements, and buying now is mostly in small lots. Discounts are as follows:

*Iron Boiler Tubes.*

1 to 1½ inches and 6 to 13 inches.....	36½%
2½ to 5 inches.....	45½%
1½ to 2½ inches.....	35½%

**Merchant Pipe.**—A good deal of business is being placed in Pipe and the market is said to be in better shape than for some time. The new prices are being observed and buyers have more confidence in placing orders more freely than for some time. Pittsburgh Basing Discounts, which have been adopted by the leading mills, are as follows:

(Subject to no preferential discounts.)

	Merchant Pipe, Steel or Iron at our option to be shipped.	Merchant Pipe, guaranteed to be Wrought Iron.	Full weight, guaranteed Wrought Iron.	Full weight, guaranteed Steel Pipe.
	Blk. Galv.	Blk. Galv.	Blk. Galv.	Blk. Galv.
1/8, 1/4 and 3/8.....	68	58	65	55
1/2.....	70	60	67	57
3/4 to 6.....	75	65	72	62
7 to 12.....	73	63	70	60
Plugged and Reamed:				
1 to 4.....	73	63	70	60
Cut 3 to 6 feet:				
1/8, 1/4 and 3/8.....	63	52	60	49
1/2.....	65	54	62	51
3/4 to 6.....	71	60	68	57
7 to 12.....	69	57	65	54
Cut 6 to 6 feet and longer:				
1/8, 1/4 and 3/8.....	64	53	61	50
1/2.....	66	55	63	52
3/4 to 6.....	72	61	69	58
7 to 12.....	70	58	66	55
Extra Strong, Plain Ends:				
1/8 to 8.....	69	59	65	55
Threads only.....	Same as Plain Ends, plus 1½ per cent., net.			
Threads and Couplings.....	Same as Plain ends, plus 3 per cent., net.			
Double Extra Strong:				
1/8 to 8.....	61	51	57	47
Threads only.....	Same as Plain Ends, plus 2 per cent., net.			
Threads and Couplings.....	Same as Plain Ends, plus 3 per cent., net.			

NOTE.—Orders for less than carloads will be charged at 12½ per cent. advance. Extra and Double Extra Strong cut lengths, lower random discounts by 10 per cent. net for 6 feet and longer, and 15 per cent. net for 3 to 6 feet.

**Iron and Steel Scrap.**—The market on Old Material is very quiet and will likely remain so until after the first of the year. A good many mills will close during this month for inventory and repairs and will not take in any Scrap until after they get started. We quote Heavy Melting Stock at \$21 in gross tons; No. 1 Cast Scrap, \$19; No. 1 Wrought Iron Scrap, \$20.50 in net tons; Cast Iron Borings, \$11.50 in gross tons; Old Iron Rails, \$25 to \$25.50 in gross tons.

**Coke.**—Upward of \$7 to \$8 a ton continues to be paid for Furnace Coke for prompt shipment. On contracts for first six months and in some cases through all of next year Connellsville Furnace Coke is being sold at \$3.75 to \$4 a ton. Foundry Coke brings \$4.50 to \$5 a ton on contract. A material advance in freight rates on Coke will probably

be made on January 1. Output of the Upper and Lower Connellsville regions last week was about 285,000 tons.

The offices of Henry Aiken, consulting engineer, have been removed from Lewis Block to the works of the Hydraulic Machine Company, of which Mr. Aiken is president, at corner of McCandless avenue and Allegheny Valley Railway, Pittsburgh, Pa.

## The Belgian Iron Market.

BRUSSELS, November 15, 1902.

Generally speaking the situation of the Belgian Iron market has grown worse. Order books of the works are poorly supplied, and what inquiries do appear from time to time can only be secured by the cutting of prices. This, it appears, is done with no good effect by our Ironmasters, since instead of producing a slight increase in consumption the lower prices only redound to the benefit of middlemen, who hold their orders as long as possible, discounting fresh lowering in prices. This unfortunate situation is due very largely to the fierce competition of the German rolling mills, which enjoy obvious advantages. They pay considerably less for fuel than we do in Belgium. This is proven by the fact that even the works of the Charleroi district, like Providence and Monceau St. Tiacre, consume nothing but Ruhr Coal, in spite of the fact that they can supply themselves by water transportation. Besides, account must be taken of the system of export premiums adopted by the different German syndicates. These do not exist in Belgium. Costs, too, are lower in Germany than in Belgium, so that our foreign markets are being captured by the German conquerors. German mills are also supplying more and more the Belgian markets for products which we ourselves make. A striking example is furnished by the following: A Belgian construction shop which had occasion to use a 4-ton forging ordered it in Westphalia at a very much lower price than its own cost, although it was in a position to produce it in its own shops. There can, therefore, be no question of a serious improvement in Belgium until there has been a rise in the international market. It is true that if the works in the United States went on indefinitely with overflowing order books, if Germany could overcome its depression and if English mills had more work, our own country would feel the effects. The struggle for life would be less serious if there was only a lowering in the prices of raw materials, and notably in fuel; but owing to the miners' strike in France our collieries object to any reduction in prices, and they have even raised their figures on domestic Coal and on Briquettes.

Pig Iron has also become very firm. Luxemburg Forge cannot now be secured at less than 51 francs, and No. 3 Foundry Iron is selling at 60 francs. Charleroi Mill Iron is quoted 55 francs and Thomas Pig 63 francs. As compared with prices a year ago this indicates a decline of 2 francs for Thomas Pig, but on the other hand a rise of 2 francs in Foundry Iron and of 3 francs in Mill Iron. This firmness in prices is due largely to the threat of higher prices for Coke for 1903. Those rolling mills that are not fully covered will probably object to pay more money for such little additional lots which they may have to purchase for the balance of the year. As yet there can be no question as to prices for Pig Iron from January on. The furnaces have not made their contracts for Coke, and the consumers of Mill Iron do not consider the present situation stable enough to enter into engagements.

Steel is very well held. Ingots are quoted at about 87 francs; Blooms, 93 to 94 francs, and Billets, 98 to 99 francs. Muck Bar is quoted 90 francs.

So far as finished products are concerned the situation varies a good deal in different branches. Large Shapes are in light demand at the present time, and there are only small transactions at unremunerative prices. Beams are being sold at 132.50 francs for home consumption, and £4 11s., f.o.b. Antwerp. The Plate mills are suffering a good deal from want of regular orders. This week the representatives of the mills have met in order to consider the question of raising prices and reaching an understanding. Possibly a syndicate may be formed with a selling bureau. The preliminary negotiations, however, have not led to any result. Heavy Plates are sold at £5 8s.; medium weights, £6, and Sheets, No. 14 gauge, £8. The two latter grades have been inquired for in fairly good quantities for India and Japan. Firm orders, however, have not been placed, the greater quantity of the work going to Germany. In Merchant Bars, both Iron and Steel, the situation is more favorable. Some important business has been placed during the course of this month through London houses, and some of the mills are even now quoting prices from the works higher. This, however, is the exception, the current quotations being generally £5 to £5 2s. for Iron Bars and £5 2s. to £5 4s. for Steel Bars, f.o.b. Antwerp. For the home market 135 and 140 francs, respectively, is being maintained. The Rail market is in relatively the best position. All the works that make a specialty of this branch have enough orders to keep all their trains running.

The Bolt shops are not well supplied, and are working from day to day. The Wire Nail mills are complaining very much of English and American competition, particularly in the Eastern and extreme Oriental markets. They state also that there has been a very sharp reduction in the home consumption. Construction shops, so far as they handle rolling stock, are overloaded with work. The State Railroad will soon give out contracts for cars and material, which, it is estimated, will amount to 3,500,000 francs.

## New York.

NEW YORK, December 3, 1902.

**Pig Iron.**—The market in this district is quiet, and the premium for prompt delivery shows a tendency to disappear. Foreign Iron is readily available, and some of the producers of domestic Pig manage to squeeze out some metal to take advantage of the high prices. The lessened buying from this side has had its effect upon the European markets, and Middlesbrough Pig No. 3, which at one time cost \$19.25, ex-ship, cash, against documents, can now be laid down at close to \$18. For the first half of 1903 the following nominal quotations are made: Northern Iron, at tidewater, No. 1 X, \$24.50 to \$25; No. 2 X, \$23.25 to \$23.75; No. 2 Plain, \$22.50 to \$22.75. Tennessee and Alabama brands, in New York and vicinity: No. 1 Foundry, \$25 to \$25.50; No. 2 Foundry, \$24.25 to \$24.50; No. 3 Foundry, \$23 to \$23.50.

**Steel Rails.**—Inquiries continue to come in on a liberal scale. It is estimated that the capacity for the year 1903 will be fully 3,250,000 tons. This allows for the considerably increased production of the Ohio mill at Youngstown and a fair amount for the new works of the Lackawanna Steel Company at Buffalo, the Tennessee Company at Ensley, Ala., and the Colorado Fuel & Iron Company at Pueblo, Col. There is not taken into account the possibility that the Union Steel Company may build a Rail mill at Donora, Pa., which is said to be in contemplation. We continue to quote Standard Sections at \$28, at Eastern mill.

**Finished Iron and Steel.**—Among the contracts for structural work placed during the week were 9500 tons of bridges by a Western railroad company, 4000 tons by an Eastern road, a hotel building on Sixtieth street, this city, taking 1000 tons, and the Mercantile Trust Building, 500 tons. More bridge work is coming up with Eastern railroad companies and it is coming along with greater satisfaction to the bridge companies, being scattered, instead of being concentrated in a short period of time. The Plate trade is quiet. Eastern mills are still unable to run to more than half capacity owing to the shortage of fuel. We quote, at tidewater, as follows, but for small lots and prompt delivery higher prices are being obtained for Structural Material: Beams, Channels and Zees, 2c. to 2.25c.; Angles, 2c. to 2.25c.; Tees, 2c. to 2.25c.; Bulb Angles and Deck Beams, 2.10c. to 2.25c. Sheared Steel Plates are 2.10c. for Tank, 2.20c. for Flange, 2.35c. to 2.40c. for Fire Box. Refined Bars are 1.90c. to 2c.; Soft Steel Bars, 1.80c. to 1.90c. Foreign Beams are 1.75c. and Angles 1.80c., ex-ship, New York, in large lots.

**Old Material.**—Cast Scrap is in good demand, and prices are maintained. On all other classes of Old Material business is very light, the demand from the West having decidedly fallen off. As usual, when the demand subsides, stocks appear to be growing larger and anxiety to sell is manifest. Dealers look for lower values, but are hopeful that after the turn of the year the demand will improve. Selling quotations are as follows, per gross ton, f.o.b. cars in this vicinity:

Old Iron Rails.....	\$22.00 to \$22.50
Old Steel Rails, long lengths.....	20.00 to 20.50
Old Steel Rails, short pieces.....	18.00 to 18.50
Relaying Rails, heavy sections.....	29.00 to 30.00
Relaying Rails, lighter sections.....	33.00 to 35.00
Old Car Wheels.....	19.50 to 20.00
Old Iron Car Axles.....	25.50 to 26.00
Old Steel Car Axles.....	24.00 to 25.00
Heavy Melting Steel Scrap.....	18.00 to 18.50
No. 1 Railroad Wrought Scrap Iron.....	20.00 to 21.00
Track Scrap.....	18.00 to 18.50
Bushelling Scrap.....	14.00 to 14.50
No. 1 Machinery Cast Scrap.....	19.00 to 20.00
Stove plate.....	13.00 to 14.00
Wrought Turnings, delivered at mill.....	16.00 to 16.50
Cast Borings, delivered at mill.....	9.50 to 10.00

**Pittsburgh Steel Company.**—The Pittsburgh Steel Company of Pittsburgh, with works at Monessen, Pa., expect to start up their rod mill on Wednesday, December 3. This is the last department of the new works to get started, and the whole plant, comprising rod mill, wire nail mill, wire and wire fence departments, will then be in full operation. The rod mill is of the Garrett type, and is capable of turning out 500 tons of rods per day. The company are meeting with a very heavy demand for their Pittsburgh Perfect fencing, which is the only electrically welded wire fence on the market, it being made by them exclusively.

## Iron and Industrial Stocks.

Transactions have been fairly numerous, with an advancing tendency as the financial situation grew clearer. The most notable advances were as follows: Republic, common, 18 $\frac{1}{8}$  to 21; preferred, 76 to 78 $\frac{1}{8}$ ; Tennessee, 56 $\frac{1}{4}$  to 58 $\frac{1}{8}$ ; Cast Iron Pipe, preferred, 52 $\frac{1}{4}$  to 54; Steel, common, 35 $\frac{1}{2}$  to 37 $\frac{1}{8}$ ; preferred, 82 $\frac{1}{4}$  to 84 $\frac{1}{4}$ ; Virginia Iron & Coal, 34 to 38. The Allis-Chalmers Company's stocks having been listed, quotations on the New York Stock Exchange appeared on them for the first time during the past week. The common ranged from \$20 to \$21. Some effort to depress industrials was made on the strength of expected rough treatment in the President's message, but bear attacks had little effect, as pains had been taken to give out a correct forecast of the conservative position which the President would take regarding trusts.

At a meeting of the stockholders of the Manufacturers' Light & Heat Company of Pittsburgh, held in that city last week, it was decided to increase the capital stock from \$5,000,000 to \$10,000,000. The company will issue \$600,000 of the authorized increase at once. The stock will be put out to stockholders at par, \$50, in the proportion of one share of new stock to about eight of the old.

Treasurer Taylor of the William Cramp Ship & Engine Building Company addresses the following to stockholders: "At a meeting of the Board of Directors held this day, November 28, it was determined to be inadvisable to declare a dividend at this time. The net earnings of the company for the first six months of the year amount to \$337,317, or \$85,890 in excess of the earnings to the same date of last year; but the growing business of the company calls for a larger working capital, and it was resolved to retain the net earnings for the present for the use of the business and the reduction of the floating debt."

**Allis-Chalmers Company.**—The Allis-Chalmers Company in an application to the New York Stock Exchange for the listing of their preferred and common stock, which has been approved, submit the following balance sheet as of September 30, 1902:

Assets.	
Real estate, buildings, plant, machinery, good will, &c.....	\$28,331,324
Bills and accounts receivable.....	2,319,059
Stocks of merchandise, materials and work in progress (at cost).....	4,082,099
Cash.....	2,298,539
Total.....	\$38,031,013
Liabilities.	
Capital stock:	
Preferred.....	\$16,250,000
Common.....	20,000,000
Accounts payable.....	\$1,064,845
Dividends accrued.....	184,583
Surplus April 30, 1902.....	\$304,759
Profits, April 30, 1902, to October 1, 1902.....	\$695,783
Less dividend on preferred stock declared and accrued.....	473,958
Surplus for five months over dividend on preferred stock.....	221,825
Total surplus.....	526,584
Total.....	\$38,031,013

**American Steel Foundries Company.**—There has been listed on the Exchange \$15,500,000 6 per cent. cumulative preferred and \$15,000,000 common stock of the American Steel Foundries Company. The earnings for two months, subject to revision, are given at \$327,461, as will be seen from the following balance sheet covering all its properties:

Assets.	
Real estate, buildings, plant, machinery and other permanent investments.....	\$28,006,846
Current assets:	
Merchandise, &c., on hand, partly estimated.....	\$1,376,629
Accounts and bills receivable.....	1,876,374
Miscellaneous investments.....	48,174
Real estate not used for business purposes.....	310,365
Cash and cash assets.....	1,228,424
Head office expenses.....	14,044
Total.....	\$32,860,856
Liabilities.	
Capital stock.....	\$30,500,000
Bonds of subsidiary companies.....	471,000
Loans, bills and accounts payable.....	1,562,395
*Profit and loss account: Net earnings for two months ending September 30, 1902.....	327,461
Total.....	\$32,860,856

\* Subject to provision for depreciation, head office salaries and expenses and other adjustments to be determined upon.

All the above property of the American Steel Castings Company is subject to a mortgage to the Guaranty Trust Company of New York, trustee, dated November 1, 1897, securing bonds in the aggregate sum of \$471,000. The bonds mature on the first day of November, 1912, and bear interest at the rate of 5 per cent. per annum, payable semiannually.

The total amount of bonds issued under this mortgage was originally \$490,000, but subsequently \$19,000 of them were taken up and canceled, and there is now outstanding, as above stated, \$471,000 of said bonds.

Shareholders of the Nickel Corporation of London are offered in exchange for each £5 full paid share of the company's £750,000 capital stock \$6.25 in 6 per cent. preferred stock and \$6.25 in common stock of the International Nickel Company. The Nickel Corporation were organized in December, 1896, to operate certain nickel properties, with interests in others, situated in New Caledonia and held in perpetuity. The properties are situated in the districts of Mueo and Kone, about 12½ miles from Mueo Bay, and comprise about 60,000 acres.

**Dividends.**—The directors of the Westinghouse Electric & Mfg. Company of Pittsburgh have declared the regular quarterly dividend of 1¼ per cent. on the preferred stock, payable January 2.

The Republic Iron & Steel Company have declared the regular quarterly dividend of 1¼ per cent. on the preferred stock, payable January 2.

The Boston Belting Company have declared regular quarterly dividend of 2 per cent., payable January 1.

International Silver has declared quarterly dividend of 1 per cent. on preferred stock, payable January 1. Books close December 5, reopen January 2.

## Metal Market.

NEW YORK, December 3, 1902.

**Pig Tin.**—Conditions were ripe for a touch of manipulation and prices were shot upward a peg or two, but they soon fell back. The opportunity was offered in the recent Banca sale, the larger part of the product of which was bought in by one operator. He manipulated the London market sufficiently to establish an advance, but as soon as support was withdrawn values receded steadily and at this writing are declining. The market here showed corresponding fluctuations. Up to the close of November the market continued weak and declining. The Banca Sale was then held, going at an equivalent of 24¼c., c.i.f. New York. As soon as this sale was over, however, the market showed marked advances and spot here reached as high as 25c. to 25¼c., while the London market was worked up to £114 5s. for spot. Yesterday the downward movement set in and the declines came as rapidly as the advances had come. At the close to-day this market had fallen somewhat, but still shows an advance over last week. Throughout all business for consumption was slow. Prices are as follows: Spot, 24.75c. to 24.95c.; December 24, 50c. to 24.75c. London, spot, £112 17s. 6d. and futures £111 15s. The monthly statistics show quite a large increase, which is usually the case at the time of the Banca Sale. The figures themselves are, however, not unfavorable. The total visible supply on November 30 is 418 tons below that of November 30 of last year.

Arrivals at the Atlantic ports amounted to.....	Tons. 2,951
Total arrivals since January 1, 1902.....	32,679
Of which from Straits by direct steamers.....	13,286
United Kingdom.....	16,600
Holland.....	1,384
European Continent.....	1,409
The deliveries for November we figure as.....	2,700
Total deliveries since January, 1902.....	31,300
The shipments from Straits amounted to.....	4,350
Against previous month.....	3,745
November, 1901.....	4,811
Australia shipped.....	313
Against previous month.....	302
November, 1901.....	278

Statistics for the United States—Pacific ports excluded—November 29, show as follows:

Stocks, November 28, including on dock and vessels.....	3,710
Afloat.....	2,755

Total..... 6,465

The total statistics for Europe and the United States, as compiled by C. Mayer, secretary, show:

Total visible supply November 30, 1902.....	Tons. 18,346
Against visible supply October 31, 1902.....	16,053
November 30, 1901.....	18,764

**Copper.**—On Monday the London market commenced to advance and prices here followed suit. A large American metal company, who have been conspicuous in their endeavor to maintain prices, are said to have been behind the London move. The advance is said to be the result of purchase made in London by the American company. At the opening on Monday the London market had reached its lowest figure with £49 12s. 6d., but since then it has advanced over £1, reaching the highest point at £50 15s., but recovering to £50 10s., which was the closing price for spot to-day. Futures are now quoted £50 16s. 3d. Best Selected advanced to £54 10s. Here the market has advanced despite the meager interest displayed by consumers. Prices are entirely nominal. Lake is quoted 11.50c.; Electrolytic and Casting, 11¼c., and Standard, 11.50c., nominal. The monthly figures show an exportation of only 16,520 tons, being the smallest

this year. European statistics for the second half of November show an increase of 1200 tons. The final figures for importation for the month of October were posted this week by the New York Metal Exchange as 7230 tons, and producing an accumulation for the month of October of 6248 tons. According to these and previous figures, the stock in this country on November 1 was 125,514 tons.

**Pig Lead.**—The market is unchanged and without interest. The official figure is still based on 4.12½c. for spot desilverized and 4.10c. for futures, New York. The London market declined a shade to £10 12s. 6d.

**Spelter.**—Scored a further decline, and is very weak. Spot is nominally 5.10c., and for December and January metal there are sellers at 4.95c. St. Louis comes 4.80c. to 4.85c., and London is unchanged at £19 17s. 6d.

**Antimony.**—The market is unchanged and as follows: Cookson's, 9c. to 9¼c.; Hallett's, 7¼c. to 7½c., and other brands, 7c. to 7¼c.

**Nickel.**—No change is noted. Large quantities down to ton lots are now quoted at 40c. to 47c. per lb., according to size and terms of order. Smaller lots are quoted as high as 60c., according to quantity.

**Quicksilver.**—The market is quiet and unchanged, the ruling quotations being \$48 per flask of 76½ lbs. each in lots of 50 flasks or more. London is unchanged at £8 15s.

**Tin Plate.**—The canning trade have been placing large orders and the American Can Company have doubtless placed a very large one with the American Tin Plate Company at present prices. Otherwise the demand is not active. The American Tin Plate Company still quotes on a basis of \$3.60 per box of 14 x 20 100-lb. Cokes, f.o.b. mill, and \$3.79, f.o.b. New York. Swansea declined 1½ pence to 11 shillings 9 pence. The movements in this industry are being followed with interest in the trade, particularly with a view of the counter move of the Welsh Tin Plate manufacturers in lowering their prices to check the efforts of the American Company in obtaining all of the "drawback" export business. As the matter now stands the American company have doubtless obtained orders from the beef packers and Western exporters, but at present prices have been unable as yet to win over the Standard Oil Company. The American Company enjoy an advantage in the case of the Western exporters owing to the necessity of hauling Welsh Plates West and then returning them in their finished state to the Eastern seaboard again for shipment to Europe. There are two freights as a consequence of this procedure to be added to the Welsh price and this brings the figure above the American price. With the Standard Oil Company and other seaboard exporters, however, this freight does not figure, and the Welshmen still get the business. In some quarters of the trade the opinion finds expression that the Eastern exporters do not wish to see the Welsh producers placed out of the race entirely, as they are not anxious to find themselves with only one producer to look to, and who can in time dictate the price. It is thought that even though the American price should be placed lower than the foreign, the Oil company will divide their orders so as to keep up the element of competition. That the Welsh producers are playing hard to retain the American business is evidenced by the fact that though the price of Middlesbrough Iron is considerably higher than it was a year ago, yet the price of Tin Plates is somewhat lower. As for domestic business, under existing conditions, consumers are showing a preference to the American Tin Plate Company, principally because the independent concerns are offering no inducements in the way of lower prices to capture the trade. Their prices are exactly on par with those of the American Tin Plate Company, and under such conditions consumers feel safer in adhering to the big company who are doing everything that can be expected to take good care of their customers. The consolidation of the Union and Sharon Steel companies, which was described in our last issue, is looked upon as of considerable significance. This merger brings together the two most formidable of the outside competitors, and it is believed that the consolidated company will operate in harmony with the American Tin Plate Company.

**The Pittsburgh Shovel Company.**—At a meeting of the Board of Directors of the Pittsburgh Shovel Company held recently in their offices in the Frick Building, Pittsburgh, it was decided to start up as soon as possible the extensive shovel works of this concern located at Leechburg, Pa. The plant has been closed down for some time, but the machinery has been kept in first-class shape and the works will be started up in full within the next month or six weeks. The concern solicits inquiries from the trade for their different brands of shovels known as "Pittsburgh," "Leechburg," "Armstrong" and "Kiski." When running full this plant is capable of turning out 200 dozen shovels per day.

## American Society of Mechanical Engineers.

### FORTY-SIXTH MEETING.

The first session of the forty-sixth meeting of the American Society of Mechanical Engineers was held on Tuesday evening at the house of the society, New York. Owing to the illness of President Edwin H. Reynolds there was no annual address, the paper by Sidney A. Reeve on

#### A Rational Solution of the Problem of Weights and Measures

being substituted. The author first outlined some of the fundamental attributes of the metric and English systems. He had "the firm opinion that the metric system is not naturally and inherently adapted to industrial needs, and that to commit ourselves finally to its universal, compulsory adoption would be a mistake of immeasurable magnitude." But he did not disclaim any belief that the metric system had been proved by experience incapable of adoption in engineering and industrial works. Locally and occasionally it had been so adopted and there had been no resultant catastrophe.

The metric system is attractive because its measures are arranged on the same system as our numerical notation; it is cumbersome because it is decimal in its arrangement. The author illustrated the latter point by the following: Thus, in this country a decimal division of currency has been compulsory by law for over a century, and is backed by all the inconveniences involved in the departure of money division from the standard system of rotation, which is decimal. Yet the division of the standard unit, the dollar, by other factors than those of 10 and its powers, by factors of 2, 3, 4, 6, 8, 12 and 16, is practically universal. Of the three decimal divisions of the dollar, the dime, the cent, and the mill, the first and the last are unheard of as units of price in ordinary retail business; the other, the cent, is almost as apt to be split by a vulgar fraction as it is to be used in its integral purity. Of all our coins the favorites are the "half" and the "quarter." The dime is used much more to make change for the quarter, because five nickels are too cumbersome, than it is as one-tenth of a dollar. We could not get along without the half-dime, or "nickel." The cent is scarcely ever used to make change for a dime. In short, decimal subdivisions are much too far apart.

Even in scientific work the same trouble is found. So long as instruments, scales, &c., are divided on the decimal system it is of course easiest to read them so. But when that artificial constraint is exceeded the natural basis for either estimating or assigning divisions is by twos or by threes. Every student has to be arbitrarily taught to estimate to tenths, and even then the result is inaccurate. Every intelligent young observer, on the other hand, naturally estimates well to halves, thirds and quarters.

It has been urged that the industrial world cannot change to the metric system because of enormous loss of investment in tools, &c. It is to be said in reply to this, with truth and force, that no mere value of investment, even if it be greater than the metric advocates urge that it is, can properly constrain so momentous a decision. But the question goes deeper than that. It is also true, on the other hand, that not even the boldest disregard of expense can hope to alter the inherent human preference for halves, thirds and quarters over tenths; and no mere monetary gain, however imaginably great, could counterbalance the loss of human efficiency due to the repression of that preference, could it be accomplished.

On the other hand, the scientific world could change over from a decimal to a duodecimal system with greater ease than could any other portion of the human race make a similar change.

The author then discussed his proposed duodecimal system, which introduces new signs and names. The following illustrates the method:

In the machine shop transition to the new system could be made without the slightest change or expense for new tools, &c. New patterns would naturally run on new habits of dimensioning, but old patterns could be produced with no interference whatever with the new. The only obstacle to the adoption of the new system would be the necessity for the learning of the duodecimal multiplication table by each machinist, which could be done in three weeks of evenings. The standard divisions on the scales now in use in the shop would be expressed as follows:

$\frac{1}{2}$ inch = 0.6 quarter.	$\frac{7}{8}$ inch = 3.6 quarter.
1-16 " = 0.3 "	$\frac{5}{8}$ " = 2.6 "
1-32 " = 0.16 "	5-16 " = 1.3 "
1-64 " = 0.09 "	5-32 " = 0.76 "
1-12 " = 0.4 "	5-64 " = 0.39 "
1-24 " = 0.2 "	7-64 " = 0.53 "
1-48 " = 0.1 "	9-64 " = 0.69 "
$\frac{3}{4}$ " = 3. "	11-64 " = 0.83 "
$\frac{5}{8}$ " = 1.6 "	13-64 " = 0.99 "
3-16 " = 0.9 "	15-64 " = 1.03 "
3-32 " = 0.46 "	17-64 " = 1.09 "
3-64 " = 0.23 "	19-64 " = 1.23 "

Until the duodecimal multiplication table is learned these figures seem more confusing than helpful. But even without that preparation, let any shop arithmetician sit down to these duodecimal fractions, thinking only in dozens, and trace their relations; he will finish with a strong first impression of the facility and convenience of duodecimals.

The duodecimal statement of these same fractions in terms of an inch is only slightly less clear and facile than the above. Thirty-seconds and sixty-fourths require three duodecimal places instead of two. It is finally to be remembered that these duodecimal expressions for the familiar vulgar fractions can be multiplied, divided, &c., more easily than can decimal fractions—when once the duodecimal multiplication table is learned.

#### Report of Council.

The annual report of the council showed a total membership of 2349, not including those admitted at this meeting. The circular issued last February urging members to take such action as they could toward defeating the Congressional bill making the metric system compulsory is again issued.

In the matter of reducing the expenses of the society, the council approves the action of the Executive Committee in curtailing the general distribution to all members of advance papers before the meetings, the discontinuance of gratuitous distribution of revised papers, with discussion, after the meetings; the diminished use of return postal cards and the issue of only two lists of members during the year. The report states:

Economy may be effected here in two ways: The number of accepted papers may be reduced, and the size of the annual volume which goes to each member; or, the mechanical standard in printing and illustration may be lowered, and the price cut, without impairing the professional value of the volume; or both of these courses may be taken at once. It is the emphatic opinion of the council that the first alternative should be taken only in the last resort. The volume of the papers is to many members of necessity a very valuable return from membership; the quality of the papers gives the society its repute and standing at home and abroad; these papers are the reason and cause for successful and valuable conventions of members; they are the principal appeal for accessions of new members and the continued growth of the society. So far from curtailing here, the society should expand in the direction of more papers, of wider interest, of superior quality and usefulness, even if it must expend something more to attain these results.

On the other hand, the effect of lowering the mechanical standard of printing and illustrating the papers is not so far reaching. A cheaper grade of compositors can be employed; a diminished number and size of illustrations can be admitted; folding plates may be eliminated or reduced; the elegant wax process for cuts can be replaced by cheaper reproduction processes; tabular matter can be cut out or diminished; coated paper for half-tones can be discontinued. With respect to the distribution of papers, the edition of papers issued in advance of meetings has been cut down in size, and such papers sent only on order, and not to every member before a meeting, as hitherto. Members have been charged for each copy of every revised paper they order after it has been read and discussed.

The second paragraph will be read with interest, particularly in view of the fact that the society has never been noted for the excellence of its engravings, especially the half-tones.

A most valuable paper on

### The Metric System

was read at the Wednesday afternoon session by F. A. Halsey. We take the following extracts:

The pro-metric argument is substantially an *à priori* argument. The metric advocates adopt the methods of the old philosophers who laboriously sought to prove what ought to be. My method is that of modern science, which interrogates nature in order to learn what is. For instance, they tell us how easily and how quickly this nation ought to make this change; I shall show how slowly and laboriously France and Germany have made the change. They will say that we ought to adopt this system to please our foreign customers; I shall show that our foreign customers do not care one penny whether we adopt it or not, and I shall prove it by a flood of evidence.

In their efforts to show how easily the metric system may be adopted by this country, the metric advocates endeavor to create the impression that it has already made considerable progress. Thus Mr. Stratton, Director of the National Bureau of Standards, stated at the hearings of the House Committee that the Carnegie Steel Company were about to issue a metric edition of their hand book. I quote here because this is too important to be treated in any other way. In questioning Mr. Linnard Mr. Stratton said: "And that the Carnegie people are about to issue a hand book in which all the formulæ are printed in the metric system? Has that been called to your attention?"

Following is an extract from a letter by the Carnegie Steel Company: "In reply to your inquiry, we beg to advise that we have not issued a hand book containing formulæ according to the metric system and have no present expectation of doing so."

Mr. Stratton repeated this statement before the Western Society of Engineers, and with it made another, his words being as follows: "The National Tube Works have one of their largest mills fitted up for the system. The Carnegie people are getting out their hand book in the metric system."

Following is a letter from P. C. Patterson, mechanical engineer of the National Tube Company:

I find the following conditions prevailing in regard to the use of the metric system in this company's business:

Lap welded pipe for foreign countries using the metric system is made to either the American or English standard. Special lap welded goods ordered to metric measurements are made to the nearest fraction of an inch, no attempt being made to get closer than within 1-16 inch of the dimension called for.

Seamless tubes are made to exact metric measurements when ordered by metric measurements.

Mr. Halsey submitted much evidence to show that the metric has by no means been generally adopted in Germany. In the textile industry alone there are nine different ells in use in addition to the metric and English yard. These ells are divided into inches, an inch ranging all the way between 1-20 and 1-36 ell, so they have such extraordinary ratios as Prussian ell, 25½ inches; Wurtemberg ell, 34¼ inches, and Vienna ell, 29½ inches. The raw material is purchased by the English pound. The finished goods are sold by the French meter. The yarn counts are English, while the length and width of the finished goods are metric. The length of the yarn is expressed in meters, while the counts are English, based upon the yard and the pound. From this hodgepodge the weight of the yarn is calculated in grams, which is extended by another arithmetical somersault at a price given in marks per English pound, and to cap the climax the total length of the yarn in meters is reduced to English yards and then to English skeins of 560 yards each.

There is no theory here. This estimate is an example of German practice at this moment, and yet men can be found who say that the metric system was adopted in Germany in two years without inconvenience, some asserting they were present when the trick was done; and stranger still, other men can be found who believe it.

In France the condition is, if possible, still worse. After noting the wide use of tables giving equivalents of the many standards in use the author says: Following this comes the following beautiful example of how the decimal system has swept all before it in France: "The

lea is 300 yards, or 274.2 meters; 12 leas make a skein of 3600 yards; 100 skeins a bundle of 360,000 yards."

Henry Hess was formerly with the Niles Tool Works, and when that corporation established its great branch works at Berlin, under the name of the German Niles Works, he was selected to go to Germany, in order to carry American practice and American methods there, and form a connecting link between the two companies. Please remember that he is actively engaged in machine construction; not in a business capacity, but as a designer and constructor, and he knows the facts from the inside.

I have a personal letter from Mr. Hess dated at the German Niles Works, September 15, 1902, from which I quote the following (italics mine):

It is quite true that the great majority of these [old provincial inches] are no longer in use; still it is to-day necessary to be very careful in using rules that are purchasable in every hardware store, to make sure whether the inches that are given on the reversed side are Rhenish or English inches.

Nearly universally the carpenters and other building mechanics use the Rhenish inch, and we have occasionally found that men in our shops have made use of their private Rhenish foot rules.

As to this matter in France I cannot tell you very definitely, but I believe that similar conditions exist there, though not to so great an extent.

At my request Mr. Hess has sent me a collection of these German made scales, which, in addition to the sacred millimeter, give upon their various edges the English, the Rhenish, and the French inch, the latter measuring 37 to the meter, as already explained. In an accompanying letter, after saying that the purchase was made "in one of the larger retail hardware shops in Berlin, located in the manufacturing district," he goes on to say:

In talking with the proprietor, I learned that practically all of the small tradesmen with whom he has to deal still stick to the use of the inch, and when they want to sell them anything according to meters, they are informed that they are used to the inch and foot and do not wish to be bothered with the meter.

To understand the full force of this it must be remembered that to sell goods by other than metric measures in Germany is a finable offense, and Mr. Hess' informant has, in fact, paid such fines for acceding to his customer's demands. This condition of things obtains 28 years after the system was made compulsory in Germany.

Too late for insertion here, I find in the collection of consular reports for November, 1902, a three-page table of foreign weights and measures, which "embraces only such weights and measures as are given from time to time in consular reports and in commercial relations." Of the localities given in this list 60 per cent. are nominally metric, and in it are 103 units, having all the way from one to nine values each, and of 80 per cent. of which, it is safe to say, no American has ever heard the names. The author then shows the persistence of the old units. Following is an extract from a letter from the superintendent of machinery of the Mexican Central Railway, Ben. Johnson. The letter is dated at Mexico City, October 7, 1902:

We use nothing whatever but American measurements in the work of the mechanical department. Our drawings of locomotives and cars and our shop tools are all in American measurements, and as far as my information goes, this is the case with nearly all railroads in Mexico.

In his reasons for the length of the transition period. Mr. Halsey says that if this system were made compulsory to-morrow, and the people were to receive it with enthusiasm, the gas pipes in the ceilings of our homes alone would keep the old system alive for 50 years. Remember the proof that has been given that the metric system necessitates metric sizes. Now make the gas tips which we replace so often with metric threads, and there isn't a chandeller in this country that will take them. Make the chandeliers with metric threads and there isn't a gas pipe end projecting from a single ceiling in this country which will take them. A fair question to ask here is, how long does it take on the average for a gas pipe to wear out? Our friends tell us that for a time we will use transition fittings with English threads at one end and metric threads at the other, but this begs the whole question. The transition fittings must be

made. The length of the pipe does not alter the thread or the tools for making it. The tools and the equipment must be preserved. The paper then shows that the adoption of the metric system would necessitate abandoning mechanical standards. It also discusses the claims of superiority for the metric system and shows the fallacy of the "foreign trade argument." As a whole the paper is a powerful argument against the metric system.

## The New York Machinery Market.

NEW YORK, December 3, 1902.

When the books for November were closed and the figures at hand it was found that the month had really been a good one, and that a bit of premature nervousness had been indulged in earlier in the month. The aggregate of sales was considerably in excess of what was generally expected. This statement does not apply to any particular branch of the trade, but reflects the sentiment of all machinery merchants in this market.

It is true that compared with the recent rush there has been a falling off in business on all sides, but orders are still sufficiently numerous to keep the wheels of production going at a brisk pace in order to supply the demand. The usual falling off preparatory to the closing of the year is being felt, and while deliveries are now much easier than they were a short time ago, regular machinery stocks are not yet up to normal.

The prediction that the spring revival of demand will quickly consume whatever stock can be accumulated in the meantime is being freely indulged in by conservative machinery merchants.

There are a goodly number of fair sized projects which are being gotten together in good shape for launching directly after the close of this year. The earnestness with which the preparatory steps are being taken leads to the conviction that they are genuine, and that nothing short of a total collapse of business will prevent their consummation.

Just as an instance of the faith of purchasers in next year, as well as illustrating the habitual curtailment of expenses prior to the preparation of annual statements, we might mention a case of a day or two ago where an order for machine tools was placed with the stipulation that they should not be delivered until after the close of the year, although delivery could be had shortly before the end of this month.

During the last three days the machinery district has presented an unusually busy aspect, because mechanical engineers, engine builders and electrical engineers from all sections of the country have made a pilgrimage to New York, this being a veritable "convention week." Proprietors of factories are paying their annual visits to their New York representatives and are inspecting generally the one mart where everything manufactured under the sun is represented.

There have been no transactions of particular importance in the machine tool trade, although a number of new propositions have come up for estimates. The Bethlehem Steel Company of South Bethlehem, Pa., are receiving figures on a large quantity of machinery for filling out their plant in its various departments. While in this case a complete list of all the machinery required has not been issued, the general impression in the trade is that the purchases will foot up to a very nice total. The machines have been classified and the specifications for each class sent out to the leading builders of the respective types of tools. It is not probable that any orders will be placed before the first of next year.

The Philadelphia & Reading Railroad are now getting ready for the purchase of a long list of tools for their new shops at Reading, Pa. This matter has been up before and some purchases were made. Consequently, the project was lost sight of for a time, and machinery merchants were a little surprised to hear from the company again.

The McNab & Harlin Mfg. Company, whose works are at Paterson, N. J., are buying their machinery equipment for large extensions to their plant. The new buildings alone, we are informed, will cost upward of \$40,000. A small proportion of the machinery has been secured, but the bulk is still unclosed.

A good sized engine order was placed this week. Woolston & Brew of 39-41 Cortlandt street captured it for the Bail Engine Company of Erie, Pa. It called for eight 150 horse-power horizontal simple throttling governor engines. They are to have 14 x 14 inch cylinders to operate at 125 pounds pressure and run 275 revolutions. The engines are to operate centrifugal pumps, being direct connected to the pumps. The apparatus is to be used in connection with the condenser system at the new power station of the Manhattan Railway. The International Steam Pump Company, who obtained the contract for the condenser system some time ago, placed the engine orders.

There is a good deal of activity at present in the cement industry, and plans are being perfected for a number of large

new plants. Engineers making a specialty of this class of work are extremely busy, but it is rather early to look for the actual purchase of equipment for the proposed plants. That bids are being solicited, however, is evidenced by the fact that one engine builder has estimates out for over 30,000 horse-power intended for this line of manufacture. This is the season for the erection of new cement plants, as there is an object in having them in operation by spring time in order to meet the demand of the spring building season.

What will doubtless prove the largest new development in this industry will be the erection of a plant in the Lehigh Valley cement belt by the Quaker Portland Cement Company, a subsidiary company of the Northampton Portland Cement Company. The latter concern, it will be recalled, are financed by Standard Oil interests and have their headquarters in the Standard Oil Building, 26 Broadway. The new plant is to be erected at Sands Eddy, Pa., and is to have a daily capacity of 4000 barrels. It is the intention of the company to make this the most thoroughly modern cement plant in existence, and every labor saving device of merit presented is given careful consideration by B. Sherwood-Dunn, the president of the Northampton Company. Mr. Dunn is also desirous of obtaining catalogues and data from builders of all kinds of machinery adaptable to a cement plant. While time is being taken to give the equipment question fullest consideration and careful study, the plans for the new mill will be formulated with the greatest expedition consistent to the main purpose. At present all matters are being handled by the New York office of the company under President Dunn's supervision. When the project reaches the construction stage, however, B. G. Boyllau, general manager of the Northampton plant at Stockertown, Pa., will assume charge.

Of the several proposed cement plants a number are to be operated in connection with iron plants, using the slag from the blast furnaces. The most recent plant of this description has just been placed in operation and it is showing flattering results. It has been viewed as a test plant and its completion was awaited with interest. Now that the actual results can be gauged it is practically assumed that the proposed plants will be erected immediately. The mill referred to is that of the Stewart Portland Cement Company, an arm of the Stewart Iron Works of Sharon, Pa. The production is 500 barrels daily. As previously stated in these columns, it is built according to the Curtin process and was erected by the Ruggles-Coles Engineering Company of 39 Cortlandt street. The latter company have just closed important contracts for drying plants with the Rockland-Rockport Lime Company of Brooklyn, the Valley Hill Sand Company of Malvern, Pa., and a company at Auckland, New Zealand, who will erect a plant for recovering vegetable oil from sand.

The Green Fuel Economizer Company of 74 Cortlandt street have just closed a number of interesting contracts. For the new power station of the Rochester, Syracuse & Eastern Railway at Canandaigua, N. Y., a 1000 horse-power installation of economizers will be placed on Thayer boilers. At Marcellus, N. Y., the Crown Mills will install two sets of the apparatus in connection with their boiler plant and for dye house purposes. The Rome Brass & Copper Company of Rome, N. Y., have just placed orders for their fifth economizer. A 1200 horse-power plant will be installed at the Perth Amboy plant of the Standard Underground Cable Company.

The American Tap & Die Company of Greenfield, Mass., who, as stated in these columns, were recently organized, are about to place their plant in operation. They have already obtained a large number of orders and the works will be built on a larger scale than first planned. The company state that they would be pleased to receive catalogues of machinery and tools pertaining to the manufacture of taps, dies, &c.

M. W. L. Perkins, Jr., formerly connected with the Fosdick Tool Company and the American Tool Works Company, Cincinnati, Ohio, has associated himself with Walter H. Foster, 126 Liberty street, New York, representing the Gisholt Machine Company, Morton Mfg. Company, Curtis & Co., Potter & Johnson Machine Company, Ingersoll Milling Machine Company, Landis Tool Company and the Fosdick Machine Tool Company. Mr. Perkins will cover the New England territory.

The W. A. Heath Machine Company of Lestershire, N. Y., are preparing to place a new line of wood working machines on the market next spring, and are building a large addition to their works for the production of the machinery.

The Harrisburg Foundry & Machine Works, Harrisburg, Pa., announce that their New York office, which has been under the management of W. P. Mackenzie, having prospered and expanded beyond expectation, will be conducted hereafter by the firm of Mackenzie & Quarrier.

The Dominion Iron & Steel Company have purchased the manganese beds located on the Magdalen Islands, about 50 miles northwest of Sydney. The property is practically undeveloped.

## Chicago Machinery Market.

CHICAGO, ILL., November 29, 1902.

An optimistic tone continues to characterize the advices received from manufacturers of machinery of various kinds throughout the Northwest. Notwithstanding the great expansion throughout the year, reports are still received of new buildings—including machine shops, foundries and warehouses—now being erected and other improvements in contemplation. It may be noted, however, that this has been probably less general throughout the month of November, although the movement toward increased capacity is still of sufficient magnitude to be a conspicuous feature.

It will be noted that there is much difference of opinion expressed by the various manufacturers concerning the difficulties experienced in obtaining raw materials. While consumers of pig iron and coke still dwell upon the unsatisfactory deliveries of such material, the general impression obtained from the reports is that some improvement has been experienced in this respect, especially in regard to the delivery of pig iron. It will also be noticed that there is a lack of unanimity in regard to experience respecting transportation facilities. As a rule, it may be stated that difficulties have been largely experienced in the East and South, and to some extent in the Southwest, but in the Northwest better service seems to have been given both in the receipt of raw material and in the distribution of the finished product. Difficulties of this kind, of course, have been experienced in the Northwest, but relatively they seem of little consequence.

The demand for power and transmission machinery appears to be maintained beyond expectations and almost without precedent. The call for electric cranes, which usually drops off at this time of year, has actually increased, and this is also true of cupolas and other foundry equipment. Not only are the works well supplied with orders, but there is much business in sight which will afford continued activity for several months.

In some lines of special machinery, due to local conditions and peculiar features of the special trade, there has been less pressure during November, but the exceptions to this rule are prominent enough to warrant special notice. In many cases orders are in hand which should have been delivered ere this, and will be carried over into the new year.

Manufacturers of machine tools, especially of the larger and more expensive type, while still busy, seem to be working under less pressure. Dealers and agents, too, in some instances have noted a slight falling off in November, but there are many instances of continued activity maintained at the highest point, and in a few exceptional instances November will prove even better than October, which in many lines was the record month of the year.

Manufacturers of boilers, engines and pumps have continued to book satisfactory orders for their product throughout the month, and while some have experienced a seasonal falling off in the aggregate volume of business, those manufacturers drawing their patronage largely from the railroads have continued overwhelmed with orders beyond their capacity to fill for months to come.

With the exception of manufacturers of wind mills and some lines of hardware, producers of small tools and general equipment supplies have experienced little, if any, decrease in the volume of business, the demand being full and well distributed. Sales of pneumatic tools have been especially heavy, manufacturers working full force, night and day, to keep pace with the constantly increasing demand.

### Machine Tools.

Hill, Clarke & Co., Chicago, note that sales made during the month of November have been unusually satisfactory, the aggregate orders booked during the month showing a material increase over the sales of November, 1901, and notwithstanding the large volume of business in October the November record will probably make it the greatest month of the year. This, in a measure, will be due to the fact that the selling force was increased recently, and results from this source are beginning to be apparent. The firm have experienced little difficulty in obtaining shipments from the East by way of Canada, and only temporary inconvenience, if any, in making distribution of goods in the Chicago territory.

Manning, Maxwell & Moore, Chicago, while noting some little decrease in business during the month of November as compared with the high record of October, have still experienced a fair degree of activity in their special lines of machine tools, and have suffered little inconvenience from lack of transportation facilities.

The Geo. Whiting Company, Chicago, report business extremely satisfactory, and during the past month have received orders for a considerable number of improved machines, and consider the outlook for the future as very favorable for a large increase in trade. They have a considerable number of inquiries from concerns who desire a complete outfit for new works, indicating that there is an intention on the part of a large number of manufacturers to increase their plants. They have experienced no difficulty in the delivery of castings, &c., and are able to secure all the mate-

rial necessary for their machinery on short notice. They expect, if the demand for their machines continues to increase as it has in the past, it will be necessary to considerably add to their equipment of machinery to maintain their place among competitors. Collections have been very satisfactory.

McDowell, Stocker & Co., Chicago, have noted that the distribution of machine tools during November has been on a less liberal scale than during October, which was the high record month of the year; but judged from the standpoint of orders booked and in sight, November will be little inferior to October, as far as the aggregate volume of business is concerned. A comparison with the corresponding month a year ago is of little value, because of the relative newness of the firm, which has been favored with a steady increase in trade from the beginning of their business. Very little, if any, difficulty is experienced either in the receipt or distribution of machinery in their line.

### Tools.

The J. H. Dawson Machinery Company, Chicago, state that their business has recently been a little quiet. They are not receiving quite the number of inquiries that they had prior to this time. Shipments from the East are coming in very slowly. They have been figuring on a number of large deals lately, none of which will be closed, however, in the immediate future. They think that the prospects are favorable for another good year of business, possibly not as heavy as the past has been, but much steadier.

The Ransom Mfg. Company, Oshkosh, Wis., have enough orders to keep them going for some time, although they are not nearly as far behind as they have been. They have noticed a tendency among some of the dealers to carry a lighter stock, and this may affect their sales for the next few weeks. They are experiencing no difficulty now in obtaining raw material, and transportation facilities are much better than they were six months ago. In fact, they have had little trouble in this direction of late. They are having an exceptional run on motor driven grinders.

The Aurora Tool Works, Aurora, Ind., say that the first part of November was rather dull in the way of orders, but during the latter part of the month business seemed to be going back to its former condition. They have no difficulty in getting what iron is necessary for business, and have very little trouble in the way of facilities for transportation.

The Hill Tool Company, Anderson, Ind., say that they have recently purchased a large brick building, and hope to be settled in it by the first of the year. Owing to the increase of their business they were compelled to seek new quarters, as the building they are now occupying is entirely too small. The new building is 100 feet front by 144 feet depth, with a floor space of about 17,000 square feet. They are purchasing additional machinery for their plant, and expect to work a larger force of men than heretofore. They contemplate putting several new things on the market, and hope to have them out by the first of the year. Business for the past month has kept up remarkably, and the outlook for the future is very gratifying.

The Anderson Tool Company, Anderson, Ind., say that business in the machinery, gas engine and arc lamp departments is very satisfactory and collections fair. While they have no complaints to make as to the receipt of raw material they have had considerable trouble, due to delay in transportation of goods shipped, notwithstanding that Anderson is located on the lines of the most direct routes to a number of large cities.

The Wilmarth & Morman Company, Grand Rapids, Mich., state that October shipments were in amount more than for any one month for a year past. They are now anticipating a good business during the coming winter with the new Yankee drill grinders, friction countershafts and mandrel presses. They have experienced but little serious difficulty in the matter of freight shipments, except on the Pennsylvania system in the State of Pennsylvania.

The American Machinery Company, Grand Rapids, Mich., report that the last month has shown a very gratifying increase in orders, especially for larger and more expensive machines, and business in sight for the immediate future indicates a continuance of these conditions. The volume of trade in their line, while rapidly growing, is especially noticeable for the appreciation of quality and efficiency, and an absence of demand for cheap makeshifts. Their branch house in England reports a very satisfactory trade, but does not find general conditions as favorable as in this country. The company have just added very largely to their equipment in an effort to keep up with the demand. They have experienced great annoyance from delays in small shipments on special material, which coupled with the inability of manufacturers to fill this class of orders promptly has seriously curtailed their output, and they are constantly called on by customers to trace shipments which failed to reach them in reasonable time, only to find that the railroad tracing service seems to be as badly buried up as any other branch of the business.

### Special Machinery.

The Barnard & Leas Mfg. Company, Moline, Ill., say that business has been quite satisfactory for the past month, although at this season of the year it is unusual in their

line, and they naturally expect some falling off during the winter months. Regarding the outlook for the next few months, it is their impression that business generally will not be so superabundant as it has been in the past 12 months; at the same time they have every reason to look forward to a good trade for the next year. They have not experienced any particular difficulty in pig iron and coke, having fully supplied themselves early in the season, but have found considerable trouble in the delivery of goods in the East, Southeast and South. They have suffered somewhat from inability to get orders filled for shafting and bar iron from the Pittsburgh district, but have been able to secure from Chicago enough to keep going without great inconvenience.

The Bignall & Keeler Mfg. Company, Edwardsville, Ill., report that business continues very good, and runs along evenly without any "peak load," so to speak. For the last six or eight months it has consisted principally of small orders received from all parts of the country, which shows a healthful condition of business and a continuance of the present prosperity. They are planning to increase facilities in the near future, but have nothing definite decided upon as yet.

The Stover Mfg. Company, Freeport, Ill., say that business the past month with them was not very satisfactory, but is now picking up and looking better than for some time. They have had no trouble of late in obtaining pig iron. The principal trouble is in getting coke of the right kind. The outlook for the future is very good. The country at large is too wet for an active wind mill business, and the feed has been too good in the fields for an active feed mill season. Throughout a considerable portion of the feeding district there is very much soft corn, and they are not looking for a big demand for feed grinders this season, although the early indications were very favorable.

The Adams Company, Dubuque, Iowa, say that orders for machinery have been increasing. They believe that many foundries are preparing to install additional numbers of molding machines. They are sold ahead for some time for the Farwell machine. No improvement has been noticed in the delivery of pig iron and coke; the principal trouble seems to be caused by the sellers of this material giving the high priced orders preference, and hence they neglect to fill those lower priced orders that they accepted many months ago in good faith. If any foundry is willing to pay the present high prices for iron or coke, it is the company's experience that it is easy to obtain the material wanted. As to the future they think the present high price of material is keeping back a great many building projects, and probably a large amount of building will never be done until there is an "easing up" in the price of all kinds of building material. This, of course, will affect the entire hardware line.

The Goodman Mfg. Company, Chicago, report that they have been for some time very much rushed with orders, and the demand for their machinery is increasing rapidly. They are experiencing considerable delay on account of the congestion with the railroad companies and shortage of cars in getting out shipments as rapidly as they would like, but there seems to be some improvement. Delays in obtaining material also continue, owing, no doubt, to the great demand for material by all manufacturers.

The D. Clint Prescott Company, Menominee, Mich., report that while orders continue to come in with the accustomed increase, it is with a great deal of difficulty that they get deliveries on raw material, and while they thought a month ago it was somewhat easier, now do not think the situation is improved any.

Williams, White & Co., Moline, Ill., have been able to get pig iron in pretty good shape for the last month or two. Coke, however, has bothered them considerably. They have had no trouble in obtaining cars for shipping machinery, and have found business conditions very good. Their new machine shop is just about ready for use now and preparations are being made to occupy it.

The Holthoff Machinery Company, Cudahy, Wis., say that they have found conditions of trade during the past month about the same as for several months. They see no falling off, nor is there any indication that the demands for their product are lessening. They say that the demands upon them for mining machinery, boilers, tank work, pipe lines, &c., have been far in excess of what they contemplated when the company were organized about four months ago, and there is every indication that it will continue so. They have considered the advisability of increasing the capacity of their boiler shop, but can say nothing positive regarding it at this time. If extended, they know that they can fill the shop with work, but prefer to go a little slow at starting.

#### Power Transmission Machinery.

The Northern Engineering Works, Detroit, Mich., say that business has been very good during the past month. The demand for electric cranes, which usually drops off somewhat at this time of year, has actually increased. This is true also of foundry cupolas and other machinery which they make. In reference to structural steel, which they buy in large quantities, they say that deliveries have been a little

better than in the early part of the year. This is partly due to their having anticipated requirements and placed orders well in advance. There has been considerable trouble in securing prompt transportation and delivery from the railroads, but this has been apparent more or less for a year or more, and it is but little worse now than it was some time ago. They have no difficulty in getting cars for their own shipments. The company are putting in the foundations for an addition to their crane erecting shop, extending it to a length of 70 x 200 feet wide. They are also building a new warehouse for the storage of castings. Plans are being made for a new tool room, which will probably not be built for some months. The volume of business for the year will be considerably greater than that of last year.

The Link-Belt Machinery Company, Chicago, report that the condition of business for October was exceptionally good, and that the outlook not only for the balance of this year but for next is extremely gratifying. They are unusually busy preparing proposals for prospective work, and shall carry over into the new year more unfinished business than ever before in the history of the company. While they have had some difficulty getting supplies of pig iron and coke, that condition seems to have very materially improved the last few weeks, and they are now having little or no difficulty, so far as transportation is concerned. They are erecting, as an addition to their plant, a new structural iron shop, 125 x 336 feet, which they hope to have completed by February 1.

The Industrial Works, Bay City, Mich., say business continues in volume about the same as during previous months. They are considerably delayed in work by shortage in fuel and raw materials.

The Stephens-Adamson Mfg. Company, Aurora, Ill., say that the volume of business is not as heavy as it was three months ago. Inquiries, however, are very satisfactory, and there is a large amount of business in sight. They are experiencing no difficulty whatever now in getting deliveries on pig iron or coke. They have, however, had some difficulty in getting cars from the transportation companies, especially for Eastern shipments. They have just completed a three-story building which will considerably increase their manufacturing facilities. They believe that the demand for their class of manufacture will continue nicely through the winter, and conditions for getting raw material will be much more satisfactory than they were during the congested summer months.

The Webster Mfg. Company, Chicago, say that the iron situation, so far as it has affected them, has become very severe. It has been almost impossible to get pig iron. The furnaces with which they have contracted have been unable to supply them, and now have shut down. They are, however, getting some pig iron from the South. General trade has kept up pretty well, though it is not driving them as hard as it did two months ago. They have work ahead for several months.

#### Engines, Boilers and Pumps.

The W. W. Whitehead Company, Davenport, Iowa, report that their business has been good during the past month, with an excellent outlook for the next few months. They are confining their attention to the building of light narrow gauge locomotives and heavy iron working tools, for which there is an active demand.

The Aetna Foundry & Machine Company, Springfield, Ill., say there seems to be very little change in the situation from a month ago. However, after January 1 next they look for a slight reduction in the prices of raw materials, and by July 1 at the latest a settled basis. The outlook for the coming year is good, and if contracts can be let on present basis of costs the manufacturers should reap some of the profits which have been going to the producers of raw materials.

The Witte Iron Works Company, Kansas City, Mo., say that the condition of business during the past month has shown no let up, and the future outlook is bright. They expect to increase their facilities very materially in the near future, but the details of same are not yet ready for publication.

The Charter Gas Engine Company, Sterling, Ill., report a very favorable business in the past month, and the outlook is good for future trade. They have had some better delivery in pig iron and coke and other raw materials. Upon the books of the company are orders for three 40 horse-power engines from a customer who already has one of that size Charter in use and other carload orders are also in sight.

The Otto Gas Engine Works, Chicago, report that their past month's business has been especially large. The disposition to curtail purchases among railroads at this time of the year does not now seem to exist. Looking over ten months' business they find November exceeds that of any other month.

The Quincy Engine Works, Quincy, Ill., state that they have had very good business during the month of November, and are pleased to note an improvement in the receipts of pig iron. They are, however, at present troubled by lack of coke, due to the failure of parties with whom they have contracts to make prompt shipment. They see no change as to other materials.

E. O. Williams, Chicago, notes that the sales of second-hand engines during the month of November have been satisfactory, the business closed making November a fair average month, but there is important business pending, which, if closed, will carry the record of November among the highest, if not the greatest, of the year. It is notable that the demand for engines and boilers recently has come largely from Alaska, to which territory some important shipments have been made.

The Marinette Iron Works Mfg. Company, Marinette, Wis., report that they are now well supplied with iron and coke, the easier conditions having allowed a large accumulation of both commodities, and in the meantime transportation facilities have eased up considerably. Their factory is still crowded with work, being three or four months behind in the filling of contracts, and many new orders for large gas and gasoline engines are still being received.

Union Steam Pump Company, Battle Creek, Mich., say that the present outlook has not been so brisk throughout the country as it had been for some months, but it is generally considered more of a matter of change of season than of anything else. Their usual yearly contracts are all in and they are very well supplied for the coming year.

The Henry Vogt Machine Company, Louisville, Ky., state that the outlook in their line of business is especially favorable at this time. During the last month they secured a number of large orders, and have had considerably more inquiries than usual at this time of the year for ice machines and boilers. They are now moving to their new plant at Tenth and Ormsby streets, where with largely increased facilities they can take care of much more business than ever before.

The Vilter Mfg. Company, Milwaukee, Wis., state that they have been exceedingly well pleased with the number of sales made in the line of Corliss engines, as also refrigerating and ice making machinery, and the outlook for considerable business in these lines in the near future is also good. Deliveries in pig iron and coke have been very unsatisfactory, but they hope for improvement shortly. While transportation facilities for shipment of their product are fair, occasionally cars are not set on track in proper time. They are, however, considering the congested state of affairs elsewhere, reasonably well satisfied. They have just made an addition to their foundry, thereby considerably increasing its capacity.

The S. Freeman & Sons' Mfg. Company, Racine, Wis., say that their business during the past month has been very good. They have entered orders for a great many boilers. The internally fired corrugated furnace boiler, which they have been making a specialty of for the past two years, is growing in popularity very fast and there seems to be more inquiry and more orders for that type of boiler than for any other kind. Their implement business is also very good, although it has not been during the past few months as good as it was a year ago. They do not look for any let up in the demand for manufactured goods in their line within the next few months; in fact, do not see why the iron and steel business should not continue to be good for the next year. There is but slight improvement in the delivery of pig iron and they have managed to get coke only through persistent efforts. For the past six months they have had great difficulty in getting reasonably prompt deliveries of raw materials. They do not remember in their business experience when the mills seemed to be so mixed up and lacking in system as far as filling orders is concerned as they have been during the past six months. As regards new buildings, they say that they had intended putting an addition on the west end of their boiler shop of 100 x 110 feet, but found they could not depend upon getting structural material for this building before winter set in, and decided to defer building operations until spring. In the meantime they propose getting the materials on the ground, if possible, so that there will be no delay after having once started.

#### Tools and Supplies.

The Chicago Pneumatic Tool Company, Chicago, state that their business continues to show expansion from month to month, October having developed the largest month's business in their history. From the reports received from their representatives all over the country they confidently expect that business will keep up to the high water mark for a long time to come. As regards their foreign business they say their business throughout Europe has practically doubled within the past three months. They have to some extent felt the freight congestion in the slow delivery of supplies to the air compressor plant at Franklin, Pa., but aside from that have been but little inconvenienced and have not found any difficulty in the Northwest. They are operating all their plants to their fullest capacity, and at two of them are working day and night. To be able to serve patrons in Great Britain and on the Continent of Europe more promptly they are contemplating the establishment of factories abroad, and it is expected that President J. W. Duntley, on his present trip to Europe, will arrange for such extension.

Chas. H. Besly & Co., Chicago, have experienced a very

satisfactory trade during the month of November, the volume of business comparing well with November, 1901, and also showing an improvement over the previous months of the present year, notwithstanding the general activity that has prevailed. Not only have Gardner grinders been generally distributed, but it is notable that the demand for Helmet temper taps has been widely extended, orders having been received from Europe, South America and India, in addition to the orders from the domestic trade. They note that the difficulty experienced in obtaining castings, especially of malleable iron, has not improved during the month, the delay experienced in obtaining structural material also having checked building operations on their new warehouse, which is now being constructed. This building will be 76 x 150 feet, with three stories and basement, of mill construction, and is much needed to relieve the company from their present cramped quarters. It is worthy of note that the company have doubled their capacity during the past year at the Beloit Works, recent additions adding fully 25 per cent. to their capacity.

The S. Obermayer Company, Chicago, report that the past month and October were record breaking months in the history of the company in the volume of business transacted. They also state that there is a good outlook for future trade. Transportation facilities are adequate for the prompt handling of the company's product, and the company are well satisfied with the way in which their goods are moving forward.

Joseph T. Ryerson & Son, Chicago, say that the requests for heavy machinery from railroads are increasing materially. Many inquiries made early in the year for suggestions as to equipment for large plants are now resulting in orders. The general demand for smaller tools and lighter machinery has not abated.

### Cincinnati Machinery Market.

CINCINNATI, OHIO, November 24, 1902.

The busy conditions of the past year continue in the machine tool trade, with a good promise for the future. Domestic business, of course, constitutes the great bulk of business, though the foreign demand is to some extent on the mend. The past few months have added the coke and iron questions to the list of ordinary problems to be solved, but there is a feeling that the iron situation has been relieved, and no manufacturers, so far as known, have been actually pinched with want. The trouble, while looking pretty real at times, was in the main one of apprehension, as far as the shortage in pig iron or other raw material was concerned. Mention has been made in former letters of the building boom now in course in this city. In addition to those buildings, mention of which has been already made, the First National Bank, which by the way is located in a very handsome structure built some ten years ago on the corner of Third and Walnut streets, is preparing to erect a 20-story building on the southeast corner of Fourth and Walnut, just one square north of their present location. The capriciousness of "trade" and "business" is amply testified to in this proposed move. Here is a large financial institution whose building at the time of its erection was supposed to be a clincher, which would anchor the financial center forever, or thereabouts, on Third street. The fact, however, that between Third and Fourth streets is a rise of some 30 or 40 feet, and the growing disinclination of people on the upper level to walk even one square down and up hill for banking purposes leads the First National Bank to invest a million or more dollars in a new structure for the purpose of "getting up into town." The new building, as far as determined upon, is to be of steel construction, and is to be thoroughly equipped with the very latest thing in vaults and safety deposit arrangements.

Mention was also made a short time since that M. E. Ingalls, president of the Big Four Railroad, had started the construction of a steel and concrete building at Fourth and Vine streets. Work is still progressing upon the foundation, but owing to the fact that this method of construction is a novelty here as well as in most other locations, the Building Inspector has refused, on his own authority, to grant a license for the construction. This is not done with the intention of discouraging the erection, but for the purpose of shifting the responsibility from his own individual shoulders to some commission to be agreed upon by the proper authorities. It is to be hoped that the delay will not be a serious one, and that Mr. Ingalls will be given a chance to demonstrate the utility of this particular class of construction.

The machine tool firm of Schumacher & Boye are found in a very busy and prosperous condition, with such an increase in the present and for the future that they have been obliged to purchase a large lot adjacent to their present shop, upon which they will immediately begin the erection of a two-story brick and iron addition. It goes without saying that the equipment will be the very latest that can be purchased, and the addition is expected to be ready for occupancy by February 1.

The Cincinnati Milling Machine Company report the conditions as favorable as they have been at any time within a year. Foreign orders are showing some increase, and trade in the Eastern part of the United States is specially active. Among recent orders from that section of the country, one for 15 new pattern milling machines, has recently been received from a leading printing press factory.

The Cincinnati Punch & Shear Company are having an excellent year, the best in fact which they have ever had, and from the present amount of inquiry it looks as though the high tension was to continue. The feature of the trade is the demand for large machines, and the main question in taking an order is ability to deliver. Orders do not seem to come from any special section of the country, but a large proportion of them are from railroad and boiler shops over a widely extended area. The demand for large multiple punch machines is good, and a recent shipment was one of the larger size to an iron and steel company of Chicago. One of their heaviest bending machines was recently delivered to the Thompson Iron Works at Philadelphia, also two very large punches for Heyl & Patterson, Pittsburgh. They have now under construction a large bending roll for the League Island Navy Yard and a very heavy punch for the Herreshoff shops at Bristol.

The Cincinnati Shaper Company are very busy on the dual proposition of attending to their current trade and preparing to remove to their new quarters in the West End early in December. The new shop, as has been previously stated, is in the center of the new machine tool district, and is located on a 3½-acre tract on Elan street. Their capacity will be very largely increased by the addition of a number of new machine tools and the most modern shop equipment they could possibly procure.

The Lodge & Shipley Machine Tool Company are also very busy in looking after their flourishing trade, and also in adapting themselves to largely increased area and capacity. William Lodge of this company was recently elected vice-president of the National Machine Tool Builders' Association at their meeting in Cleveland. The association, by the way, placed itself on record against the proposed adoption of the metric system as the standard of measurement in this country.

The Lane & Bodley Company report very good progress in the construction of their plant at Bond Hill. It is the expectation of the company to remove from their present quarters early in the coming year. They are now building a pair of winding engines, 24 x 42, for a coal mine in Virginia; also a 20 x 40 x 48 compound engine, weight about 150 tons, for a cotton mill in the South; also two 500 horsepower cross compound engines for the Evansville & Princeton Traction Company.

Pothoff & Frey, architectural iron workers, report business excellent, with all the orders which they can possibly handle. They have at a recent date very largely increased their quarters, and now occupy, in addition to their old building, those structures extending south to Front street, and also the one on the east.

The Hoefinghoff & Laue Foundry Company have been obliged to shut down their Norwood plant on account of the shortage of coke, but they expect to be able to resume work out there at an early date. Among their recent orders is one for 500 tons of structural castings from an Eastern city.

The American Laundry Machinery Company report business excellent, and prospects for a good year never any better than they are now. Their new plant at Norwood is about completed and ready for occupancy, and their chief interest for the residue of the year will be the removal and fitting up in their new quarters.

The Cincinnati Planer Company are likewise experiencing the problem of growth, and their most recent move is the commencement of a one-story warehouse on the west side of Spring Grove avenue, between Harrison and Queen City avenue. While this is at some little distance from their main works, they feel that the remaining room unoccupied adjoining their factory must be reserved for manufacturing purposes.

Some time since it was announced that the Niles Tool Works of Hamilton, Ohio, had outlined a very extensive series of additions and improvements to their present plant, which when completed would give them an increased capacity of about 500 men. The plans made necessitated spanning one of the city streets with a runway for a traveling crane, and in other ways interfering somewhat with the public properties. It was thought that there would be no trouble in inducing the City Council to grant permission for this work, but the unexpected has happened and the Council has refused to concede the request. This necessitates other plans, but owing to the location of the available space for building, it is a little difficult to see just how the enlargement is to be carried out. It is, however, a matter of absolute necessity to the company, and beyond question they will in some manner arrive at a successful solution.

The additions to the Hamilton Corlies Engine Works are now nearing completion, and the new machine shop is 400 feet long by 317 feet wide and the new foundry 408 feet long by 110 feet wide. The floor space is about five times

that of the old shops. The company expect to occupy the new quarters by January 1. The foundry is equipped with 50-ton cranes and a 75-foot span.

The Long & Allstatter Company of Hamilton are very busy with the construction of the heavier class of machines. Among those in process of erection is one 10-foot multiple punch, with the largest automatic feed for spacing attachment to carry a plate 50 feet long.

The Black & Clawson Company, builders of paper mill machinery and users of very large quantities of iron, have recently increased the capacity of their plant by the addition of improved machinery. They report business excellent, with orders on their books for the erection of a number of the largest sized mills.

## The Philadelphia Machinery Market.

PHILADELPHIA, PA., December 1, 1902.

There has been practically no change in the condition of the Philadelphia machinery market during the past month. The market is weak in some lines, but no anxiety is felt as to the prospective condition of the trade. The present inactivity is believed to be only temporary, and is not unusual at this season, and will probably continue during the remainder of the year. The amount of inquiries in the market at the present time indicates in a measure greater activity in the near future. Some very good specifications are being estimated upon, and a fair day to day business is being done.

The various railroad companies will soon become extensive buyers, both for replacements and for the equipments of new shops, while in some instances a good deal of new machinery will be added to the present equipment. This business, however, except in case of urgent need, is not expected to be contracted for before January.

The manufacturers of heavy tools, cranes, heavy engines, locomotives, &c., have their plants taxed to their utmost capacity, with orders on hand for delivery well into next year. Others have their output for several months contracted for, with a good daily business coming in. A number of plants are being seriously affected by the after conditions of the anthracite coal strike, together with the congested condition of freight traffic on the various railroads. This has resulted not only in the continued scarcity of anthracite, but also a famine in bituminous coal and coke. The inability to obtain gas coal has caused a number of the local and nearby plants to shut down some of their various departments temporarily, while with others conditions at the best are of a hand to mouth order. Prices of coal and coke have advanced, and pig iron still continues a very uncertain factor, as far as its delivery is concerned. These conditions have had a material effect on the market and caused innumerable delays. This, together with the present uncertainty as to the movement of freight, makes it practically impossible to make anything like reasonable deliveries on contracts.

Foreign demand for machine tools is inactive, although a large business continues for some specialties, such as pneumatic tools and machinery.

The various iron and steel foundries have been materially affected by the scarcity of raw materials, the steel foundries by the shortage of gas coal and the iron foundries by the short supply of coke, and both branches of the trade have been equally handicapped by the scarcity and difficulty in obtaining adequate supplies of both pig iron and scrap. Under such conditions there has necessarily been no improvement in the delivery of castings, although it is said that a few foundries can make a fairly prompt delivery on gray iron castings, but only under special conditions.

The demand for the lighter engines, boilers and small tools has been satisfactory during the past month, manufacturers having a good amount of business ahead, enough to keep their plants busy well into next year. Machine shop supplies continue unchanged; some specialties are hard to get and most plants are being taxed in order to make deliveries.

Prices generally remain unchanged, being firmly held; and with increased cost of manufacture it is contended that no reduction can be made without loss of profit, and in many cases present costs warrant even higher prices than are being made. No manipulation of prices is noticeable at the moment.

The Falkenau-Sinclair Company are busy. Inquiries are said to be plentiful and of a satisfactory nature, some good orders having been received, and the plant will be kept busy for some time. A number of large testing machines and some heavy presses are among the work nearing completion. Among recent shipments by these parties were three special automatic feed presses, long stroke machines, 56 inches between uprights. A heavy special No. 5 press was delivered to local parties, and several Nos. 1, 2 and 3 presses have been shipped to out of town buyers. A number of 15-ton horse-power gasoline engines have also been completed for the Union Motor Truck Company of this city.

W. E. Shipley, Philadelphia agent for the Lodge & Shipley Machine Tool Company, reports a good average business during the past month. Inquiries continue numerous, but

in some cases the actual placing of orders is being deferred for the time. There has been a ready sale for medium size tools, and several large ones have also been sold for local and nearby delivery.

The Franklin Machine Works, Incorporated, continue busy in all departments. Inquiries have improved and some good orders have been taken. Business conditions for next year are considered satisfactory, and orders on the books are sufficient to run them well into next year. Some recent deliveries of tools include a No. 2 Franklin cold saw cutting off machine and two Franklin horizontal boring, milling and drilling machines for the Fournier Searchmont Automobile Mfg. Company, Trainor, Pa. These latter tools are equipped with the Franklin new special circular table, which can be placed or removed at will and making the tool practically a combination one. A number of their other tools have also been shipped to local and out of town customers.

The Espen-Lucas Machine Works report a number of orders for their new cold saw cutting off machines, which are said to be quite satisfactory. They also advise us of several duplicate orders. These parties have recently installed a new engine and other machinery, and are quite busy. A number of the various sizes of their cutting off machines have been shipped to local and out of town parties.

The Philadelphia Pneumatic Tool Company continue very busy in all departments. The plant is being operated to its best capacity, and business conditions for the coming year are considered favorable. Foreign demand for their pneumatic tools remains good, and some large orders have recently been booked, among the the number being one for a lot of 100 hammers; the shipyards and railways being the most extensive buyers. The Royal German Navy Yard at Kiel, Germany, have been lately equipped with a full line of the Philadelphia Pneumatic Tool Company's tools. There has also been an active demand for pneumatic foundry rammers, several orders for good numbers have recently been delivered to Western parties. Stone cutting and dressing tools have also found increased sale, and shipments of a number of these tools are to be noted.

The American Pulley Company note a continued active demand for their product, both from foreign and domestic sources. Their plant is being kept busy in all departments, and a number of good orders are being booked, some recent ones for export being from Geneva, Switzerland, and from New Zealand. A large amount of work has also been booked for next year's delivery. Shipments of pulleys embrace both foreign and domestic deliveries; the Western and Southern parts of the United States, as well as the local territory being large consumers.

The Eynon-Evans Mfg. Company have their new foundry building practically completed, and will shortly begin the installation of necessary furnaces and other equipment. They are quite busy in the pattern shop, a large amount of out of town work being on hand. The foundry is feeling the effect of resumption of coal mining in the amount of orders received for acid resisting bronze castings for various uses in the mines. A good demand is also noted for steam jet blowers and condensers, some large sizes of each having recently been shipped.

The Tabor Mfg. Company have during the past month made deliveries which exceed in the aggregate a greater total than in any previous month in the company's history. Inquiries are said to be exceedingly good, and a number of orders have been booked, both for foreign and domestic delivery. Among some of the shipments during the past month may be mentioned five split pattern molding machines for export to England, three of which were 13 x 20 inches, one 14 x 16 inches and one 24 inches square; two machines, one 20 x 30 inches and one 16 x 26 inches, both split pattern vibrator frame type, to the American Locomotive Company's Schenectady, N. Y., plant; two 13 x 18 inch machines to the Pittsburgh Valve & Fitting Company for their new shop at Barberton, Ohio; two 14 x 16 inch split pattern, power ramming machines to the Walworth Mfg. Company, Boston, Mass., and one 16 x 22 inch vibrator frame machine to the Luicola Iron Works, Rutland, Vt. The United States Steel Company, West Everett, Mass., have been shipped a 7-inch power ramming vibrator frame machine, and a 13 x 18 inch split pattern machine has been furnished the Crosby Steam Gauge Company, Boston, Mass. Molding machines have also been furnished the Geo. V. Cresson Company of this city and the Goulds Mfg. Company, Seneca Falls, N. Y.

Continued activity is to be noted at the crane department of the Niles-Bement-Pond Company. The various additions to their plant (mentioned in our previous reports) are progressing rapidly, although it is now hardly expected that they will be completed before the early spring. Inquiries for cranes of all classes are numerous, and a large amount of work is on their books. All departments continue on double turn, and every effort is being made to make deliveries promptly. Among some of the recent deliveries may be mentioned two additional cranes, each 10-ton capacity and of 56 and 57 foot span, which have been shipped to the Philadelphia & Reading Railway, for their new shops at Reading, Pa. A 30-ton crane, with 5-ton auxiliary hoist, is being erected for the New York Central & Hudson River Railroad at their Oak Grove, Pa., shop. A 20-ton 50-foot

span crane has been shipped to the Tube Steel Company, Wheeling, W. Va., and a 15-ton 50-foot span crane to the Tidewater Steel Company, Chester, Pa. Two cranes have been erected for the American Turret Lathe Company, Warren, Pa., and one has been shipped the Southern Engine & Boiler Works, Jackson, Tenn. Two 30-ton and one 50-ton cranes have been shipped to the Hoozen, Owens & Rentschler Company, Hamilton, Ohio, and another is ready for delivery.

The Energy Elevator Company, with their largely increasing business, have found it necessary to add to their facilities. A building adjoining their present plant has been leased, and over 4000 additional feet of its floor space will be devoted to the erection of elevators. The plans for equipment of the new building have not yet been determined. They have also added another room to their drafting department, so as to enable them the better to handle this branch of work. The Energy Company report a very satisfactory condition of business, the amount of work done this year so far being more than double that of last year. Inquiries are numerous, and some good orders have been taken. Recent shipments include, among others, a large freight elevator for Lorain, Ohio, an ornamental dumb waiter for Atlantic City, N. J., and freight elevators for York, Pa., and Ocean City, N. J. A large carriage lift is being installed at Hinkley, Ill., and a freight lift, the third of its kind, has been shipped to Hamlet, N. C.

The Baldwin Locomotive Works continue active in every department. The various improvements to the plant (previously mentioned in these columns) are progressing favorably, and each floor of a building is being pressed into service as soon as it becomes a story high. Inquiries for locomotives continue very satisfactory, and some good orders are being booked. Over 13,000 men are being employed in this plant, and many more are expected to be required when improvements now going on are completed. Some recent deliveries of locomotives include shipments to the Missouri, Kansas & Texas Railroad, the Southern Pacific Railway, the Southern Railway and others, while delivery to individual concerns have also been made.

The Diamond Drill & Machine Company, Birdsboro, Pa., expect to begin making castings in their new steel plant during the present month, and have booked a number of orders for delivery in January, 1903. They also expect to begin making castings in the new iron foundry by the middle of this month. The machine shop is running on night turn, and a large number of important contracts covering both iron and steel castings and general machine work are on their books.

### Meeting of Engine Builders.

At the annual meeting of the Engine Builders' Association of the United States, held in New York on Monday and Tuesday, December 1 and 2, a number of interesting papers were read and considerable profitable discussion was indulged in by the members. The first day's session, at which the papers were read, was open to the public, but the transactions of Tuesday were behind closed doors. At the latter session matters relating purely to the business management of the various engine builders represented were discussed. The election of officers resulted in the selection of Wm. M. Taylor of Chandler & Taylor, Indianapolis, Ind., for president; C. A. Gates of the Russell Engine Company, Massillon, Ohio, for vice-president; F. P. Ide, A. L. Ide & Sons, Springfield, Ill., for secretary, and C. S. Bonsall, Buckeye Engine Company, Salem, Ohio, for treasurer.

On Tuesday evening the annual banquet of the association was held at Sherry's.

Among those present were: D. N. McBrier, Ball Engine Company, Erie, Pa.; Charles R. Vincent, Ball & Wood Company, 120 Liberty street, New York; Thomas C. Wood, Ball & Wood Company, New York; C. S. Bonsall, Buckeye Engine Company, Salem, Ohio; S. B. Richards, Buckeye Engine Company, Salem, Ohio; Wm. M. Taylor, Chandler & Taylor, Indianapolis, Ind.; C. H. Sembower, Orr & Sembower, Reading, Pa.; Nathan B. Payne, the Payne Company, Elmira, N. Y.; D. W. Robb, Robb Engineering Company, Amherst, N. S.; C. A. Gates, Russell Engine Company, Massillon, Ohio; John E. Sweet, Straight Line Engine Company, Syracuse, N. Y.; S. F. Bagg, Watertown Engine Company, Watertown, N. Y.; Walter S. Kerr, Westinghouse, Church, Kerr & Co., New York; M. N. McLarren, Ball & Wood Company, New York; F. P. Ide, A. L. Ide & Sons, Springfield, Ill.; J. L. Lyle, Buffalo Forge Company, Buffalo, N. Y.; John Simons, New York Safety Steam Power Company, New York; G. S. Smith, Ball & Wood Company, New York.

# HARDWARE.

THE wisdom shown in preparing the programme for the New Orleans meeting of the American Hardware Manufacturers' Association when "Factory Costs" was made a prominent subject for discussion will be recognized by manufacturers generally, and especially by those who listened to the interesting papers presented, or the much larger number who read them in our columns. The need for considering this subject does not lie in the fact that it is invested with anything of novelty, for it is one of the questions that constantly force themselves upon the attention of manufacturers. The reason for discussing it before such a representative body resides in the fact that a proper solution of the question as it presents itself to each manufacturer is a matter of extreme importance and at the same time of very considerable difficulty.

It is a recognized general principle that care and accuracy in ascertaining and keeping track of the cost of goods is essential to the success of a manufacturing enterprise. In a line so diversified as Hardware this is not an easy matter, but, whatever the difficulty, it must in all ordinary cases be overcome, as those in direction of the business apply in the factory methods which bring together and formulate the various elements of cost, such as material, labor, productive or nonproductive, a fitting proportion of the fixed charges, and the multitude of minor expenses which, though often underestimated or entirely ignored, are an important element in the aggregate cost. Manufacturers' prices are to a great extent determined by their competitors, or, what is the same thing, by the current market values, and unless it is known what the goods actually cost when everything that enters into the making of them is taken into account there is great danger that a portion at least of the business is being done at a loss. It is a matter of common observation that many manufacturers, especially the smaller ones, fail in this department, and the records of the trade are full of examples in which capital, probably limited at the outset, has been gradually encroached upon, and notwithstanding a good volume of business the enterprise is overtaken sooner or later by disaster. Defective methods, or the lack of method, may be in many cases ascribed to carelessness or ignorance, and the associated manufacturers do well to bring the subject up that its importance may be impressed upon all who are producing goods for the Hardware market. The discussion is the more timely inasmuch as the subject is of interest also to manufacturers who have given it a large measure of attention. Such manufacturers, indeed, whose methods have been carefully devised and answer their purpose admirably, are the very ones who are on the alert constantly to discover improvements in them so that at a minimum of care and expense there may be increasing accuracy and comprehensiveness in their methods in this field.

If, however, neglect in this matter and the resulting ignorance of the cost of producing goods had a bearing only on the success of an individual manufacturer the subject would not have the importance which it possesses in view of the broader interests of the trade. It may be assumed that the career of a manufacturer who neglects a knowledge of the cost of his goods will be comparatively brief. During the five or ten years, however, in which he has been exchanging his capital for experience it is probable that he has been a demoral-

izing factor in the market. Not knowing the cost of his wares, he has been marketing them at a loss and probably keeping down the prices of his competitors to a correspondingly low level, thus being a disturbing influence in the market at large. A grotesque instance of wrong method in estimating cost and the consequent making of ruinously low prices is afforded in the case of the manufacturer who is said to have put on the market at an extremely low figure a certain minor article in the line of Wooden Ware and who explained that he was enabled to do this "because the lumber cost him nothing, as he used what was left over from other goods," and he did not need to figure labor because "he had to run his factory anyhow." This exaggerated case will doubtless suggest to many manufacturers competition which they at one time or another have had to meet in which, in simple matter of fact, their competitors did not know that they were disposing of their product at a loss. If the association are successful in cultivating better methods in this regard it will be advantageous not only to the manufacturers immediately interested but to the trade at large.

## Condition of Trade.

The trade in all departments gives indications of the approach of the end of the year. There is the stimulus that is connected with the Hardware trade, the placing of orders for winter goods too long deferred and the general replenishing of stocks which have become depleted. There is also a good deal being done in the way of placing orders by the larger trade for next season's requirements in such lines as are usually bought at this time, but the effect of the holiday season and closing year is felt also in the diminished movement of goods generally. The smaller trade are giving attention to preparations for holiday business, and with the general activity which exists in trade are kept busy in attending to the regular routine of their stores. The approach of the year's end is connected in the thought of most merchants with the annual inventory, and in anticipation of this stock taking there is a desire to avoid the purchase of goods not definitely required. The condition of the market is such, too, that the trade are not placing orders as freely as some time ago. The declines which have been occurring in several lines of staple goods are being accepted by the trade in a reasonable way and without materially weakening their confidence in the market as a whole. There is, however, a recognition of the fact that values are high in many lines and that a descent to a lower level is only a question of time. There is accordingly a disposition to hold back somewhat in the placing of orders for goods not needed at once. The volume of business owing to these influences is not so large as it has been. This does not interfere, however, with the anticipation of fine business next season. In most portions of the country the expectations are that trade will be most excellent in at least the early part of next year, and merchants and manufacturers are making their preparations accordingly. The outlook for export business is very gratifying and the indications point to a materially increased outgo of miscellaneous Hardware and metal products during the year to come. The attention given to foreign fields by the large corporations and by prominent manufacturers generally who can afford to pursue a broad minded and far sighted policy gives assurance that in many leading lines at least the foreign market will not be neglected. The existing prosperity finds illustration, too, in the extent to which manufacturers are increasing



values is considered by many to be a necessary adjustment to conform to the present status of incomes.

### Philadelphia.

**SUPPLER HARDWARE COMPANY.**—Since our last semi-monthly letter to *The Iron Age* three conventions of importance have been held—the National Hardware Association held its eighth annual convention at New Orleans November 19, the first annual convention of American Hardware Manufacturers was held in the same city during the same week, and the National Founders' convention was held in Detroit one week later.

Regarding the first two it would be useless to enter into any particulars or details, as the issues of *The Iron Age* of November 20 and November 27 take up the matter very fully and in a more able, detailed and explicit manner than would be possible in any short reference which could be made to the same, nor could any information be given here which was not contained in one of these two editions.

The two meetings held in New Orleans—namely, the National Hardware Association convention and the meeting of the manufacturers—gave an unusual opportunity for comparison of ideas regarding the existing conditions of trade as well as a comparison of views regarding the possibilities or probabilities of the near future. The fact that a few leading articles have declined in price, prominent among which being Shovels, Spades, Scoops and Tin Plate, and the disturbance in price which has taken place upon the former, was looked upon as no indication of unsettled conditions in other leading lines of goods.

A number of manufacturers freely admitted having been behind on orders during the greater portion of the year 1902, and several of them stated, although there had been a little time during the last 60 days to recuperate and catch up, that a shortage on many lines still existed, and when they took into consideration that orders from jobbers would be placed during December and January for spring trade they saw no likelihood of reducing this shortage in the near future.

The difficulty encountered by many jobbers during this year in keeping their stock up is well known by both jobbers and retail merchants. The shortage of cars has also hampered quick delivery of goods. Most of your readers have been informed of the blockade of freight cars in the Pittsburgh district, which has fortunately been relieved, something less than 50,000 cars having been moved inside of 48 hours, thus opening up traffic which practically had become stagnated. The greater portion of this shortage of cars and blockade of traffic was west of Pittsburgh, although the East has suffered to some extent. The resumption of operations in the coal mining district temporarily—but we hope permanently—has also called into requisition quite a number of cars, which added to the embarrassment. As there is scarcely a household in Pennsylvania which is not suffering from the lack of coal, the resumption of work relieves the situation materially.

The opening of Congress is looked upon by the average business man with some degree of hope that something may be done by the present session to relieve the currency situation. Especially is this the case with all persons who have occasion to devote considerable attention to the matter of finance. It is a well-known fact that the present system of issuing national bank currency is entirely inadequate to the present requirements. All persons who have given attention to our financial system admit that it is not possible to obtain United States bonds sufficient for that purpose. Of the \$450,000,000 2 per cent. bonds issued the banks hold some \$425,000,000, and no other bonds are obtainable without paying an exorbitant rate over and above their par value. Therefore it is generally conceded that some other plan for issuing national bank currency should be adopted. Various views of how this may be done have been stated by those high in authority and familiar with the subject, and it is hoped with some degree of certainty that this matter, so essential to the business community, will be taken up at the present session of Congress.

The trade have been buying quite liberally during the

past two months. Season goods have been in active demand and even regular goods are having a steady sale. We feel there is no one, either wholesale merchant or retail trader, who has had much complaint to make during the time stated.

### Nashville.

**GRAY & DUDLEY HARDWARE COMPANY.**—The volume of business being done by the Hardware jobbers continues to be remarkably heavy, considering the holidays are so close at hand. As a usual thing trade begins to slack up a little at this season, but this year it continues to be as large as it was at any time during October or November. If we have the usual increase in business in January and February it is going to be something phenomenal. There is a tremendous demand for all kinds of heavy goods, such as Nails, Wire, Iron, Roofing, Bolts, Nuts and Washers, which are selling in large quantities, and it is almost impossible to keep a sufficient stock.

The demand for holiday goods is also very large. There has been a bigger trade this season than ever before on such goods as Cutlery, Fancy Lamps, Clocks, Silver Ware, Toy Express Wagons, Velocipedes and other Christmas goods that are handled by Hardware houses.

The heads of the collection departments of the different firms in this city report that collections are exceedingly good and they are having little or no trouble in getting money when it is due.

The prospect for business the coming spring is very flattering and we believe that the first half of the year is going to be a record breaker; possibly it will continue that way throughout the year.

### New Orleans.

**A. BALDWIN & Co.**—Business has been very active for the past 30 days, but it shows a slight falling off during the past week, which is probably caused by excessive rains in a number of localities.

The prospects appear very bright for the opening of the new year, and we look for a considerable improvement after the holidays. During the balance of this month it will be quiet.

## NOTES ON PRICES.

**Wire Nails.**—While there is a fair movement, new orders are not in sufficient volume to be satisfactory to manufacturers. The recent reduction in prices has caused some of the independent manufacturers to withdraw from the market, as they cannot make Nails at a profit. The merger of the Union and Sharon Steel companies into the Union Steel Company will probably have a beneficial effect upon the stability of the market, as it eliminates the competition between these two factories. Manufacturers are not, as a general thing, accepting orders for shipment much beyond the first of the year. Quotations are as follows:

Jobbers, carload lots.....	\$1.85
Retailers, carload lots.....	1.90
Retailers, less than carloads.....	2.00

**New York.**—Demand from store for small lots keeps up well for the season. Although business would naturally decline in view of the near approach of stock taking time, the recent decline in prices has had some effect in causing conservative purchasing. Quotations are as follows: Single carloads, \$2.05; small lots from store, \$2.10. The latter price is sometimes slightly shaded.

**Chicago, by Telegraph.**—The situation is very satisfactory, the volume of business continuing quite liberal, with a more confident and settled feeling prevailing than for many months. The advance which will take place in freight rates on the first of the year has stimulated the demand for the current month, and the merging of two of the largest independent interests is regarded as favorable toward a settled market, if not toward higher prices, within the near future. Official prices remain steady at \$2 in carload lots and \$2.10 in less than carload lots, mill shipment, Chicago.

their facilities. This is, indeed, indicative of the enterprise which has prevailed throughout the country at large and of the prosperous conditions which exist almost everywhere.

### Chicago.

(By Telegraph.)

The month of November has proved a most satisfactory period for local jobbers, some reporting the largest monthly trade in three years. The open weather early in the month, while interfering with the movement of winter goods to some extent, was productive of increased orders for a number of seasonable articles, among them being Tools of various kinds. There has been quite a fair movement of a general line during the week under review, with not a few orders of moment in sight. Some jobbers are already deep in taking inventories and others will follow in the course of a week or two. The demand for holiday goods, such as Carving Sets, Pocket Knives, Skates, Sleds, &c., has increased somewhat, but is scarcely beyond the usual proportions at this time of year. There has been more call for Stove Pipe, Coal Hods, Stove Boards and other similar articles, Axes, Enamel Ware, &c., for prompt delivery, but otherwise trade has been without prominent feature. The advance of 15 cents per keg on Iron Cut Nails which was made a week ago has had but little impression upon this market, as the scarcity of Nails long since caused a premium to be paid for nearby delivery. There has been a drop in the price of Sheet Zinc, sales now being made on the basis of 6¼ cents for lots of 600 pounds; otherwise the week has not been prolific of changes so far as prices are concerned. The weakness which has further developed in Sheets and Pipe has been somewhat reflected in the jobbing trade, but only to a slight degree. The movement in Heavy Hardware otherwise has been only moderate, the merchant trade, as usual at this time of year, falling off materially. The meeting of manufacturers of Builders' Hardware in the East last week discovered a sentiment against making an advance in prices, at least at the present time, although there is less margin between the manufactured cost and selling price for goods than for many years. Keen competition between some manufacturers seemed to be responsible for lack of unanimity of action. No change in the situation of Strap and T Hinges has been developed during the week. One of the most important factors in the market at the present time is the attitude of transportation companies, and it is well to remember that freight rates will be advanced on January 1, in effect from Chicago and St. Louis to all points west of the Mississippi, including St. Paul and Minneapolis. This fact may account to a large extent for the active trade now experienced in Nails and Wire for shipment during the current month, as much money can be saved to the jobber, especially on heavy goods, by prompt action at the present time. The largest interest in Wire and Nails has notified its customers that after the first of the year the advance in freight will be added to the delivered cost of goods.

### St. Louis.

The month past has been a most satisfactory one with Hardware jobbers and conditions continue favorable. Orders received cover the general line of Hardware for immediate requirements, while orders for spring goods show an increase over previous weeks. The outlook is encouraging for a large volume of spring business.

### Baltimore.

CARLIN & FULTON.—Business has kept up remarkably well and, though this is the last month of the year, the demand still continues good, especially for seasonable goods. There is, however, general complaint all over the country in regard to the delays in transportation, and it is confined to no particular section nor any one line of business. After the experience of this fall our friends in the trade are learning that it is frequently good policy to have their orders placed in advance of the day for actual use of the goods.

The concentration of manufacturing industries may

mean economy in production, but it also very often means a congestion of business, with great annoyance to the trade.

The first half of this month is generally a very active period, especially with our near trade in anticipation of the holiday season, after which many houses take inventory of stock, during which time little else is done. The general trade conditions continue good, and indicate that business will open in the new year under as favorable auspices as ever before.

### Portland, Oregon.

CORBETT, FAILING & ROBERTSON.—Returning from an extended trip, where the writer touched or traveled through 32 of the 45 States, he is pleased to report that conditions and trade in this section are as favorable as when he left, and the promise for the future fully as bright as the most sanguine could wish for.

The farmer has been blessed with a bounteous harvest, and most of his products are bringing a fair price, while hops and wheat are high, the latter being affected by a big drop in ocean charters. Some vessels that are overdue and will not make their charter good stand to lose \$10,000 between charter and present low rate.

The writer, while East, was struck by the contrast in many sections of sky scrapers and palaces on one side and poverty and sordidness on the other, making one wonder what will be the outcome when the reaction sets in that must come soon in the very nature of things. How much pinching poverty will they stand? We thank God our lot is cast where this great difference does not exist.

### Cleveland.

THE W. BINGHAM COMPANY.—The general Hardware trade in this section is exceedingly good, and orders are not confined to any particular class of goods, but for good assortments all through the Hardware, mining, milling and manufacturing supply lines. Just now there is a good demand for Christmas goods, such as Skates, Sleds, Fancy Tea Pots, in fact the full line of holiday goods.

On account of the scarcity of coal, orders for Axes this fall are coming along in good volume, and jobbers and retailers undoubtedly will close out more of their stock this year than in former years.

A large number of orders for Screen Doors and Windows are being placed by the dealers for spring shipment. Prices are low and those who order early will stand a chance of getting their goods in time to take care of their spring trade with a good assortment on hand. These are short season goods, and dealers that put off ordering them early will be disappointed in not getting them in time.

Trade in all lines is very satisfactory and the demand is holding up exceedingly good for this time of the year.

### Omaha.

LEE-GLASS-ANDRESEN HARDWARE COMPANY.—In its general features business in this trans-Missouri region presents no changes of importance. There is a constant and steady demand for goods both from the agricultural and mining districts, so that jobbers are well satisfied with present conditions, and the same may be said of the future outlook. The Western country throughout is in excellent condition financially and industrially. Farmers are obtaining substantial values for all their productions, and as the recent harvest was fairly abundant in quantity and of good quality the general condition of affairs may be reported as very satisfactory.

The question of the future of values appears to be attracting some attention at this time. Opinions seem to be at variance on this subject. It is held by many that present values are likely to remain for a considerable time, while others assert that a readjustment to a lower plane of prices for most commodities is near at hand. It is true that wages have not kept pace with the rise in price of commodities, and the present cost of living taxes the purchasing power of the masses close to the irritating point. A general and fair reduction of

values is considered by many to be a necessary adjustment to conform to the present status of incomes.

### Philadelphia.

**SUTPLEE HARDWARE COMPANY.**—Since our last semi-monthly letter to *The Iron Age* three conventions of importance have been held—the National Hardware Association held its eighth annual convention at New Orleans November 19, the first annual convention of American Hardware Manufacturers was held in the same city during the same week, and the National Founders' convention was held in Detroit one week later.

Regarding the first two it would be useless to enter into any particulars or details, as the issues of *The Iron Age* of November 20 and November 27 take up the matter very fully and in a more able, detailed and explicit manner than would be possible in any short reference which could be made to the same, nor could any information be given here which was not contained in one of these two editions.

The two meetings held in New Orleans—namely, the National Hardware Association convention and the meeting of the manufacturers—gave an unusual opportunity for comparison of ideas regarding the existing conditions of trade as well as a comparison of views regarding the possibilities or probabilities of the near future. The fact that a few leading articles have declined in price, prominent among which being Shovels, Spades, Scoops and Tin Plate, and the disturbance in price which has taken place upon the former, was looked upon as no indication of unsettled conditions in other leading lines of goods.

A number of manufacturers freely admitted having been behind on orders during the greater portion of the year 1902, and several of them stated, although there had been a little time during the last 60 days to recuperate and catch up, that a shortage on many lines still existed, and when they took into consideration that orders from jobbers would be placed during December and January for spring trade they saw no likelihood of reducing this shortage in the near future.

The difficulty encountered by many jobbers during this year in keeping their stock up is well known by both jobbers and retail merchants. The shortage of cars has also hampered quick delivery of goods. Most of your readers have been informed of the blockade of freight cars in the Pittsburgh district, which has fortunately been relieved, something less than 50,000 cars having been moved inside of 48 hours, thus opening up traffic which practically had become stagnated. The greater portion of this shortage of cars and blockade of traffic was west of Pittsburgh, although the East has suffered to some extent. The resumption of operations in the coal mining district temporarily—but we hope permanently—has also called into requisition quite a number of cars, which added to the embarrassment. As there is scarcely a household in Pennsylvania which is not suffering from the lack of coal, the resumption of work relieves the situation materially.

The opening of Congress is looked upon by the average business man with some degree of hope that something may be done by the present session to relieve the currency situation. Especially is this the case with all persons who have occasion to devote considerable attention to the matter of finance. It is a well-known fact that the present system of issuing national bank currency is entirely inadequate to the present requirements. All persons who have given attention to our financial system admit that it is not possible to obtain United States bonds sufficient for that purpose. Of the \$450,000,000 2 per cent. bonds issued the banks hold some \$425,000,000, and no other bonds are obtainable without paying an exorbitant rate over and above their par value. Therefore it is generally conceded that some other plan for issuing national bank currency should be adopted. Various views of how this may be done have been stated by those high in authority and familiar with the subject, and it is hoped with some degree of certainty that this matter, so essential to the business community, will be taken up at the present session of Congress.

The trade have been buying quite liberally during the

past two months. Season goods have been in active demand and even regular goods are having a steady sale. We feel there is no one, either wholesale merchant or retail trader, who has had much complaint to make during the time stated.

### Nashville.

**GRAY & DUDLEY HARDWARE COMPANY.**—The volume of business being done by the Hardware jobbers continues to be remarkably heavy, considering the holidays are so close at hand. As a usual thing trade begins to slack up a little at this season, but this year it continues to be as large as it was at any time during October or November. If we have the usual increase in business in January and February it is going to be something phenomenal. There is a tremendous demand for all kinds of heavy goods, such as Nails, Wire, Iron, Roofing, Bolts, Nuts and Washers, which are selling in large quantities, and it is almost impossible to keep a sufficient stock.

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The prospects appear very bright for the opening of the new year, and we look for a considerable improvement after the holidays. During the balance of this month it will be quiet.

## NOTES ON PRICES.

**Wire Nails.**—While there is a fair movement, new orders are not in sufficient volume to be satisfactory to manufacturers. The recent reduction in prices has caused some of the independent manufacturers to withdraw from the market, as they cannot make Nails at a profit. The merger of the Union and Sharon Steel companies into the Union Steel Company will probably have a beneficial effect upon the stability of the market, as it eliminates the competition between these two factories. Manufacturers are not, as a general thing, accepting orders for shipment much beyond the first of the year. Quotations are as follows:

Jobbers, carload lots.....	\$1.85
Retailers, carload lots.....	1.90
Retailers, less than carloads.....	2.00

**New York.**—Demand from store for small lots keeps up well for the season. Although business would naturally decline in view of the near approach of stock taking time, the recent decline in prices has had some effect in causing conservative purchasing. Quotations are as follows: Single carloads, \$2.05; small lots from store, \$2.10. The latter price is sometimes slightly shaded.

**Chicago, by Telegraph.**—The situation is very satisfactory, the volume of business continuing quite liberal, with a more confident and settled feeling prevailing than for many months. The advance which will take place in freight rates on the first of the year has stimulated the demand for the current month, and the merging of two of the largest independent interests is regarded as favorable toward a settled market, if not toward higher prices, within the near future. Official prices remain steady at \$2 in carload lots and \$2.10 in less than carload lots, mill shipment, Chicago.

**Pittsburgh.**—Demand for Wire Nails is better than for some time, and mills report that specifications on contracts are coming in more freely. In fact the whole situation in Wire Nails is more satisfactory. We quote Wire Nails at \$1.85 in carloads to jobbers, \$1.90 in carloads to retailers and \$2 in small lots, f.o.b. Pittsburgh, 60 days, or 2 per cent. discount for cash in 10 days. For galvanizing Nails 75 cents per keg is charged and for tinning Nails \$1.50 per keg extra.

**Cut Nails.**—The market continues firm at the reaffirmed prices. Business is fair in volume, but is restricted to a limited number of carload orders, demand generally being for smaller quantities. Quotations are as follows: \$2.05, base, in carloads, and \$2.10 in less than carloads, f.o.b. Pittsburgh, plus freight in Tube Rate Book to point of destination; terms, 60 days, less 2 per cent. off in 10 days.

**New York.**—Small lots from store are in steady demand. The market is firm at the following quotations for carloads and less than carloads:

Carloads on dock.....	\$2.18
Less than carloads on dock.....	2.23
Small lots from store.....	2.30

**Chicago, by Telegraph.**—Local jobbers find it almost impossible to maintain full lines of Cut Nails, especially of iron, the supply being inadequate to the demand for early delivery and premiums have been paid on such goods for some time. The recent advance of 15 cents has therefore been merely a recognition of the condition existing for some time. The volume of business is not large, but fair, the market being steady on the basis of \$2.15 in carload lots, and \$2.20 to \$2.25 in less than carload lots for steel, Chicago. Iron Nails are sold on the basis of \$2.30 in jobbing lots from store, Chicago.

**Pittsburgh.**—November prices on Cut Nails have been practically reaffirmed for December shipment, with the exception that Iron Cut Nails now take 15 cents advance over Steel in the territory west of Buffalo. There is a fair volume of business in Cut Nails and the tone of the market is firm. We quote Steel Cut Nails as follows: \$2.05 base, in carloads, and \$2.10 in less than carloads, plus freight in Tube Rate Book to point of destination, terms 60 days, less 2 per cent. off in 10 days.

**Barb Wire.**—Demand varies in different sections of the country. In the East business is only fair, while in the West it is large, both on current orders and on contracts placed for forward delivery. Quotations are as follows, f.o.b. Pittsburgh, 60 days, or 2 per cent. discount for cash in 10 days:

	Painted.	Galv.
Jobbers, carload lots.....	\$2.15	\$2.45
Retailers, carload lots.....	2.20	2.50
Retailers, less than carload lots.....	2.30	2.60

**Chicago, by Telegraph.**—The tonnage in this line continues to be heavy, both as regards new contracts and the specifying on old sales. The outlook is very satisfactory and the market firm. Official quotations for Galvanized are \$2.60 for carload lots, and \$2.70 in less than carload lots; Painted sells at \$2.30 in carload lots and \$2.40 in less than carload lots, Chicago. There is a fair demand for staples and the market is steady at \$2.05 in carload lots and \$2.15 in less than carload lots.

**Pittsburgh.**—There is only a fair movement in Barb Wire, demand for some sections of the country being much better than from others. Specifications on old contracts continue to lag somewhat. We quote as follows, f.o.b. Pittsburgh, 60 days, or 2 per cent. off for cash in 10 days: Painted, \$2.15; Galvanized, \$2.45, in carload lots to jobbers; Painted, \$2.20; Galvanized, \$2.50, in carloads to retailers; Painted, \$2.30; Galvanized, \$2.60, in small lots to retailers.

**Plain Wire.**—The volume of new business is small and the tone of the market fairly firm. Quotations are as follows, f.o.b. Pittsburgh, terms 60 days, or 2 per cent. discount for cash in 10 days:

Jobbers, carloads.....	\$1.75
Retailers, carloads.....	1.80
Less than carloads.....	1.90

The above prices are for base numbers, 6 to 9. The other numbers of Plain and Galvanized Wire take the usual advances, as follows:

	Plain.	Galv.
	Base.	\$0.30
6 to 9.....	Advance over base.....	\$0.05
10.....	.....	.30
11.....	.....	.30
12 and 12½.....	.....	.30
13.....	.....	.30
14.....	.....	.30
15.....	.....	.60
16.....	.....	.60
17.....	.....	1.00
18.....	.....	1.00

**Chicago, by Telegraph.**—While there have been a few outside lots of Wire offered at slight concessions, this has been the exception rather than the rule and the volume of business has been quite liberal, the advance in freight rates foreshadowed stimulating purchases to a considerable extent, Nos. 6 to 9, in carload lots, being quoted at \$1.90, base, and \$2 from store, Galvanized selling at 30 cents extra for Nos. 6 to 14, spot.

**Pittsburgh.**—Demand is light, but the tone of the market is fairly firm, and we are advised that fixed prices are being rigidly held. We quote Plain Wire, \$1.75, base, for Nos. 6 to 9 in carloads to jobbers, \$1.80 in carloads to retailers and \$1.90 in small lots to retailers; Galvanized, 30 cents extra for Nos. 6 to 14 and 60 cents extra for Nos. 15 and 16.

**Steel Goods.**—There is, on the part of the trade, a liberal placing of orders for Steel Goods for next season's trade, and nearly all the manufacturers being united in the American Fork & Hoe Company prices are steady at the somewhat advanced quotations made necessary by the increased cost of the goods. The current prices on this line of goods are as follows, with an additional 20 per cent.:

Group No. 1, Two-Tine Hay Forks, standard sizes; boys' sizes; Fish Forks.....	60 %
Group No. 2, Three-Tine Hay Forks, standard sizes; boys' size, 10½-inch tines.....	60 and 7½ %
Sanford Diamond Tine Hay Forks.....	60 %
Group No. 3, Four-Tine Hay Forks.....	66 2-3 %
Group No. 4, Socket Four-Tine Hay Forks.....	66 2-3 %
Socket Four-Tine Manure Forks.....	60 and 20 %
Socket Four-Tine Spading Forks.....	70 and 5 %
Group No. 5, Three-Tine Hay, Header and Baler Forks.....	60 and 15 %
Four-Tine Hay, Header and Baler Forks.....	66 2-3 %
Grain or Barley Forks.....	70 %
Group No. 6, Four-Tine Manure Forks.....	60 and 20 %
Group No. 7, Five and Six Tine Manure Forks.....	60 and 20 %
Group No. 8, Spading Forks.....	70 and 5 %
Group No. 9, Potato Digging Forks.....	65 %
Group No. 11, Garden Hoes.....	70 and 10 %
Group No. 12, Meadow and Rhode Island Hoes.....	75 and 2½ %
Group No. 13, Southern Meadow Hoes.....	75, 5 and 2½ %
Group No. 14, Mortar and Street Hoes.....	75 and 7½ %
Group No. 15, Planter Hoes, regulation pattern; Sandwich Islands Planter Hoes.....	70 and 30 %
Group No. 16, Straight Shank Planter or Tobacco Hoes; Mississippi Planter Hoes.....	75 and 20 %
Group No. 17, Cotton (Light Planter) Hoes.....	75 and 7½ %
Group No. 18, Rough Finish Shank Cotton Hoes.....	75 and 12½ %
Group No. 19, Cotton Chopping Hoes.....	75, 10 and 7½ %
Group No. 20, Ladies' Cotton Hoes.....	75, 10 and 5 %
Group No. 21, Toy, Ladies' and Boys' Hoes; Onion, Turnip, Berry or Tobacco Hoes.....	75, 10 and 5 %
Group No. 22, Weeding Hoes and Rakes.....	70 and 10 %
Group No. 23, Potato Hooks; Manure Forks.....	66 2-3 %
Group No. 24, Hop Hooks; Clam Hooks.....	60 and 10 %
Group No. 25, Steel Garden Rakes.....	70 and 5 %
Group No. 26, Turf Edgers.....	60 %

**Agricultural Wrenches.**—There is some irregularity in the ruling prices on Agricultural Wrenches, and somewhat lower prices have developed under the competition which exists.

**Shovels and Spades.**—There is a fair but not especially heavy business doing in Shovels and Spades, as the trade are not disposed to order much in excess of their requirements. Some of the outside manufacturers find it a difficult matter to compete with the comparatively low prices determined upon by the association, but most of them are still in the market and meeting, or even bettering, the quotations of the associated makers. In lieu of the association rebate, some at least of the outside manufacturers are giving an extra 7½ or 10 per cent.

**Cotter Pins, &c.**—The market on this line, as noted in our last issue, is in a decidedly unsatisfactory condition. Prices are low and irregular, there being a wide diversity in quotations made on the different goods and by the various manufacturers.

**Cordage.**—Demand for Rope is only fair, which is not unexpected at this season. Manila Rope is quoted, on the basis of 7-16 inch and larger, at 11½ to 12¼ cents per pound, according to maker. Sisal Rope, on the same basis, is quoted at from 8½ to 10 cents per pound, according to quantity. A quarter of a cent rebate is usually allowed on the larger sized orders.

**Glass.**—There have been no new developments in the market during the past week. The agreement has not yet been ratified by the individual members of the National Window Glass Jobbers' Association, and a meeting is under consideration for the purpose of formulating a basis upon which all can agree as to details. Local demand continues quiet. The Jobbers' Association quotations are as follows for single and double strength Window Glass:

	Discount.
From store .....	88 and 5 %
F.o.b. factory, carload lots.....	89 and 5 %

**Paints and Colors.**—*Leads.*—The demand for White Lead in Oil, which has been quite liberal, has begun to decrease in volume. Prices for next year have not been announced, but the opinion is expressed that they will be no lower and that there is a possibility of higher values. Quotations are as follows: In lots of 500 pounds and over, 6 cents per pound; in lots of less than 500 pounds, 6½ cents per pound.

**Oils.**—Demand is light, as business for spot Oil has declined within the last week or two. There are no futures being offered, which is referred to as unusual under the conditions ruling. The independent crushers have seed, from which they could make Oil to sell in carload lots, for future delivery, at a profit. Two of the largest interests, however, have large quantities of high priced seed, and it is uncertain whether they will be able to advance Oil prices, or whether the market will remain at about present figures, or decline. The market now shows a tendency toward weakness, though no changes in quotations have taken place. This uncertainty as to the future of the market appears to be the cause of the timidity of the independent crushers in offering futures. City Raw is quoted, according to quantity, from 46 to 47 cents per gallon. State and Western brands are quoted, on the same basis, from 45 to 47 cents per gallon.

**Spirits Turpentine.**—The demand has shown increased activity during the past few days. Quotations, according to quantity, are as follows: Southern, 53½ to 54 cents; machine made barrels, 54 to 54½ cents per gallon.

## Correspondence.

### American Hardware Manufacturers' Association.

*To the Editor:* To some of us who joined the American Hardware Manufacturers' Association with high hopes that it might prove to afford large mutual benefits to the members thereof, there is quite a measure of disappointment in the course of the association thus far. The writer supposed that the bringing together of a large number of representative manufacturers would tend to bring about more satisfactory and uniform methods of doing business and assist in solving some of the vexatious problems with which we are all confronted. It was further not beyond expectation that a strong organization might be formed which could present a united front in an emergency when the demands of organized labor might become unwarranted and insolent.

So far as the writer has been able to perceive, however, the meetings thus far held have been little more than what might be called "junketing" trips. The meeting at Atlantic City in the summer was called at the same time as that of the Southern Hardware Jobbers' Association, and the one just held at New Orleans occurred at the same time as that of the National Hard-

ware (Jobbers') Association. Of course it was very pleasant for the manufacturers to meet their jobbing customers, and, incidentally, to put up \$10 apiece or more, all around, to entertain the latter; but so far as actual benefits to the manufacturers' association are concerned it would have been far better to have held separate meetings. The members of the jobbers' associations are not men whose trade can be bought by banquets, pleasure sails and free rides on the Board Walk. They will probably buy wherever they can buy the cheapest, and, while the entertainment which the manufacturers took it upon themselves to furnish was all very nice and appropriate, it is difficult to see where the benefit to the latter came in. The calling of the last meeting at New Orleans cannot be justified when the greatest good to the greatest number is considered. None but the larger and more wealthy concerns could afford to send representatives such a distance. There are scores, if not hundreds, of manufacturers whose capital is not expressed in the commercial registers in seven figures, yet who ought to be associated with the Hardware Manufacturers' Association if it is to amount to anything.

The point I seek to make is that with an association like that of the Hardware manufacturers pleasure ought to be incidental and not the main purpose. Meetings held at convenient points and devoted to the discussion of important matters, and actions taken to bind the members to certain policies of benefit to all, should be the true and only end of such an organization. So far as I can judge now, membership in the National Metal Trades Association would be of far more benefit than that in the Hardware Manufacturers', as the former organization has evidently set about to try and do certain specific things and is working energetically to gather in members and get them committed to the policies advocated.

Hoping this communication will not be esteemed by you or your readers as hypercritical, and assuring you that the writer has endeavored to look at the matter in a fair and conservative light, I beg to thank you in advance for the space which I have taken in your valued columns.

WIRES.

### Factory Costs.

*To the Editor:* In an address delivered at the convention in New Orleans, printed in *The Iron Age* of November 20, on a subject always interesting to manufacturers—factory costs as compared with selling prices—while process is mentioned location of factory is disregarded.

Might not Wooden Nutmegs made in Texas net the maker only 10 per cent. on labor, while the same selling price would net 10 per cent. on both labor and material if made up near the market?

Also, if the corn fed philosopher wants his Hardware made of boiler plate, while the bean eating Solon prefers his made of light sheet metal, why not furnish each what he wants without any remarks about the flavor of the grapes? For if C's grapes are so almighty sour that they hurt the sensibilities of A and B at long range, "you will have to show me" why the latter have to sell their good, sweet, juicy Concord at the same price. Even a Hardware jobber is supposed to be able to see part way through a wire fence.

STAPLE GOODS.

### A Pointer to Some Merchants.

The dilatoriness of some merchants in paying bills and the elasticity with which they treat the cash discount period are touched upon in the following communication from an experienced Hardwareman:

Do merchants appreciate the fact that under some circumstances they pay more for goods than under other conditions, and that these circumstances are seemingly under their control? It may be news that merchants who are dilatory about paying their bills or who insist upon taking off the 2 per cent. cash discount at the expiration of 30 or 45 days, instead of at the end of the ten days, pay from 5 to 10 per cent. more for goods than those who discount their bills promptly.

Some distributors of Hardware grade customers with reference to the prices to which they are entitled somewhat as follows: Large purchasers, prompt pay; large purchasers, slow pay; small purchasers, prompt pay, and small purchasers, slow pay. This results in four sets of prices increasing in the order named.

## Hardware Organizations.

### Washington Hardware Association.

The fourth annual meeting of the Washington Hardware Association was held in Seattle, November 13 and 14. About 25 members were present at the meeting. President Henry Mohr of Tacoma in his annual address told of the good work which had been accomplished during the past year. He said adversity brought merchants closely together, but that the past two years had been so prosperous that dealers did not feel the need of an association. Very few complaints had been received from the members. He also complimented the retiring officers for the valuable assistance they had given him.

The following officers were elected for the ensuing year:

- J. A. BECKER, Fremont, president.
- L. B. QUACKENBUSH of Morse Hardware Company, Whatcom, vice-president.
- WALTER M. OLIVE, Mission, Secretary.
- G. M. COCHRAN of Snohomish Hardware Company, Snohomish, treasurer.
- G. W. SHANNON, Anacortes, member of Executive Committee.

Mr. Olive, the new secretary, made a few interesting and instructive remarks on the subject of the mutual relations between jobber and retailer. He said that the merchants of the State of Washington realized that they were still in their infancy so far as the great commerce of the United States was concerned, but they had untold wealth in their hills and forests as well as in their lands and waters, and the State was destined to become one of the greatest manufacturing sections of the Union. He urged merchants to do all in their power to assist the local jobbers, who have evolved from the retail to the wholesale business, so as to make the cities of the State the center of commerce for the Pacific Northwest. Mr. Olive's closing remarks were as follows:

The spirit of the Washingtonians is progressive. "In helping each other we help ourselves." It is not very long ago that the mills of Puget Sound issued due bills to their employees, who in turn paid their Hardware bills and the Hardwareman paid his wholesaler, who in turn sent the bills to the manufacturer in St. Louis, who was also the consumer of the lumber, and every one was paid without any money reaching Puget Sound. Now that we have the money let us keep it here, and the day is not far distant when the State of Washington will rank as one of the leading manufacturing centers.

The retail Hardware dealers and jobbers of Seattle entertained the visiting delegates at a banquet, which proved to be a most enjoyable affair. Mr. Hurlburt of Spelger & Hurlburt presided as toastmaster and introduced the different speakers, by whom interesting addresses were made.

### Ohio Hardware Association.

Under date of the 24th ult. D. R. Burr, Piqua, corresponding secretary of the Ohio Hardware Association, has issued the following appeal to the merchants in that State who are not affiliated with the association. Reference is also made to the fact that the annual convention of the association will be held at Columbus on February 24, 25 and 26:

"IN UNION THERE IS STRENGTH."

If you are not a member of the Ohio Hardware Association you should be for more than one reason. We need your aid; you will undoubtedly need ours. The retail Hardware dealers of to-day are dependent upon one another more than ever before. By becoming a member of the State Association you will be more

friendly with your competitors, help to maintain a mutual retail interest and strengthen the association.

It now lacks but a few weeks of our annual convention, which will be held in Columbus on February 24, 25 and 26, 1903, and we should like to number you among our members. By becoming a member of the association you are also made a member of the National Retailers' Association, as the Ohio Association is affiliated with it. This gives you the benefit of the good to be derived from both associations.

A bulletin is issued by the National Retailers' Association every three months and we have found it always complete with a great many articles of interest to every retail Hardware dealer. Will you not try us for one year—the cost is small, the benefit large. Send us your application at once and inclose with it \$4, payment of one year's dues.

## Paint, and Why the Retail Hardware Dealer Should Handle It.

BY VAN CAMP HARDWARE & IRON COMPANY, INDIANAPOLIS, IND.

WE have watched with interest the growing tendency on the part of the retail Hardware merchant to handle Paint, and believe the time is not far distant when those who have not already taken up this line will do so.

Why the Hardwareman, who is always alert and not slow to grasp a favorable opportunity, should have been so slow to realize the possibilities of this line has been a surprise to us. We believe the consumer would prefer to buy his Paint where he buys the Hardware for his building, and that the dealer can increase his sales and profits with little or no effort on his part.

It is true that for many years the drug houses have laid claim to the Paint business, but this idea, along with many others which have held for years, is fast passing away, and the druggist has a sturdy competitor in the person of the Hardware dealer.

THAT THE HARDWARE MERCHANT COMES IN CLOSER CONTACT

with the user of Paint than the drug trade is very evident, and all that remains to clinch the matter is for the Hardwareman to prove without a question of doubt that his brand is equal to that sold by his competitor, and the race is easily won.

It is a fact conceded by all that the Hardware dealer, owing to the larger amount of his sales, can do business on a smaller percentage of profit than is supposed to be made by his druggist neighbor. The consumer has this indelibly impressed upon his mind, which will be one reason he will gladly give his business to his Hardware dealer.

The same is true in the jobbing line. The Hardware dealer can buy a better grade of Paint for the same money from his Hardware jobber than from either the drug houses or the manufacturer himself. Why? Because the manufacturer advertises, keeps salesmen on the road to sell Paint only, and cannot afford to sell to the retailer at the price the Hardware jobber can, who simply adds this to his numerous other lines and markets with less expense.

Another advantage to be derived from purchasing Paint from the Hardware dealer, especially if under his own brand, is the fact that the jobber, as well as the manufacturer, stands behind the brand, and assurance is doubly sure so far as quality and satisfaction are concerned.

In conclusion, we suggest that Hardware merchants who are not handling Paint investigate the matter thoroughly and embrace the present opportunity to add a profitable line to that already on their shelves.

BULL SOUS & Co., Detroit, Mich., on account of the large increase in their business, have been obliged to purchase two adjoining warehouses, 60 x 225 feet, with dockage in the rear, as is the case with their present warehouse. The buildings are five storied, and with this large addition to their space they are able to take care of their trade to much better advantage. They have also put in a roofing department, carrying a full line of all Roofing Materials, Steel Roofings and Composition Roofings.

## BRITISH LETTER.

Offices of *The Iron Age*, HASTINGS HOUSE,  
NORFOLK ST., LONDON, W. C., NOV. 22, 1902.

### Prospects in South Africa.

**B**RITISH manufacturers and merchants being uneasy in their minds as to their own special commercial prospects in South Africa, recently came together under the auspices of the National Industrial Association, forming a South Africa Trade Committee, and appointed two gentlemen, Ben H. Morgan and T. Nicol Jenkin, to proceed at once to South Africa and prepare a report for the guidance of British exporters. These two gentlemen have now returned, and have prepared each his separate report. Mr. Morgan has written on engineering in South Africa, and therein deals with the heavy lines, while Mr. Jenkin writes a report on the general trades. It is the contents of this report to which I desire to direct attention. It is published by P. S. King & Son of 2 and 4 Great Smith street, Westminster, London, S. W., and I have no hesitation in recommending every New York exporter to obtain a copy without delay, for it is full of valuable hints and suggestions as to how best to push the Hardware and allied trades in South Africa.

### A Great Future Trade.

Both of the commissioners are emphatically of opinion that a great trade will be done with South Africa in the near future. With a more energetic development both of agricultural and industrial pursuits, coupled with the undoubted wealth of South Africa in diamonds, gold, coal, and possibly copper, it is not unlikely that South Africa for some time to come will be taking part of our surplus population. If this be so, it follows that the demand for manufactured articles must grow. The book before me, while paying many compliments to Americans for their commercial dash, particularly in Hardware and metal goods, is full of valuable suggestions how to augment their trade considerably. The value of the report in general is that it is not written for the benefit of Americans at all. On the contrary, it is written with the distinct object of stimulating British manufacturers, merchants and exporters to a sense of the danger of American and German competition. That Americans are on the spot will be gathered from the following comments:

Americans especially cultivate this market. They send out pushful travelers of particularly pleasing personality, armed with specialties in addition to every-day goods; and for manufacturers who cannot afford this relatively expensive method they have provided commission houses, which undoubtedly introduce goods to the retailers' notice in a particularly successful fashion. These houses have representatives and travelers all over the country, and they issue, monthly, excellently got up and eminently practical lists of the goods they offer, with full prices, line drawings, colored plates and useful information. They continually seek to make the putting up of their goods more effective from the salesman's point of view; in short, they pay special attention to what are known as selling points. They know as well as we do, and keep it in mind better, that the public is greatly attracted by novelties. The smallest new adjustment on a standard article gives the manufacturer of the adjustment a great advantage over competitors, especially when it is advertised by an exhibition of the article itself and by well designed newspaper and other announcements.

Not that America or Germany have done nearly as much in South Africa as might have been the case. American exporters have made their mistakes just as have their British competitors. But in certain lines the commercial work done by the Americans has been successful beyond expectation. There is the well-known case of American Agricultural Implements. Another instance is the American Stove. At one time the British manufacturers did nearly the whole business. Then Americans came upon the scene. They went to work circumspectly, made special inquiry, and the outcome was the introduction of the "Pearl" type of Stove. The result is that for years Americans, by means of it, have been enabled to do practically the whole of the cheap Stove trade for the South African colonies. Even here, however, more recently there has been keen competition, for a British firm, ascertaining the actual requirements of the locality, put a Stove on the market at the same price and of slightly better quality and

finish, with the result that a considerable amount of the lost trade was reclaimed. But I will come to the question of Stoves later on.

### Packing.

It is pleasant to note that South African traders are all agreed that American packing is superior to British. At the same time instances are given where the Americans are very far from immaculate. One point where some Americans score is that when they quote for an article they give the cubical contents in weight in addition to the price, so that in preparing quotations the South African merchant has the complete cost before him. Very important, too, is it that marks should be clearly put upon all cases, so that their contents can be known instantly. Many South African traders are in an exceedingly large way of business, their warehouses being immense, and the omission of marks giving full details as to the contents of each case often occasions the trouble and expense of opening several dozen different cases to get the particular goods required. Most of the complaints as to packing are directed against the British trader, but some hints on the subject may be equally well taken to heart by Americans, and particularly those who are new to the trade. "In the matter of packing," says a large merchant, "our experience shows that English Hardware houses have much to learn from America, and in a lesser degree from Germany. British manufacturers send their goods 6000 miles over the sea in probably the same way as they would send to an English center, and if the dissatisfaction here is to be relieved British houses must take as much care with the packing of their goods as with the manufacture itself." Again, another South African merchant says that "The scale of packing charges in London is exorbitantly high, higher than the charges in any other part of the world. The manufacturers charge so much for the goods and so much for the packing cases. Americans, on the contrary, as a rule do not charge for packing at all, or, at any rate, the charge is included in the price of the goods." The packing of Cutlery is even more important than that of Hardware. It is essential that Cutlery should be so packed as to be rendered immune from the climate. Nice Knives from Sheffield on cards of a dozen exposed to changes of climate suffer from damp and soil. The German Knife is carefully packed, perhaps one in a box, and wrapped in oil paper. Americans turn out goods in the finest way, and it helps largely in the sale. Another comment:

Generally speaking, the packing of small Ironmongery should be reorganized. At present most of the small articles are packed loose in boxes, &c., with straw, and whatever room is left after the goods are dumped in is filled up with straw. It apparently has not occurred to the exporter that the space occupied by the straw greatly increases the freight. Foreign manufacturers pay attention to this, and enable the South African merchant to get goods delivered at a much lower rate than is sometimes the case when similar goods are sent from England. British manufacturers must see to this if they desire to retain the business they do with this market.

The packing of Hollow Ware would seem to be a delicate matter, for a case is quoted where a consignment of Hollow Ware was damaged to a considerable degree, due to the casks being too large. Complaint was made and back came the reply:

We submitted your claim to our works, and they certainly did not consider that they were in any way entitled to pass this claim. The shipment you refer to we can assure you was more than carefully packed. Very special attention was paid to this, and we know that better packed it could not have been. This excessive breakage cannot be helped by us, and might have happened to any other maker's goods. While being quite satisfied that no blame is attached to us, we do not wish to lose your valued orders, and under the circumstances we are disposed to meet the claim by allowing half the value of the broken goods.

The merchant declined to accept this and promptly bought elsewhere. Similar lots of Hollow Ware dispatched in smaller cases have reached their destination free of breakage.

### General Hardware in South Africa.

The total import of Hardware and Cutlery into Cape Colony in 1887 amounted to £220,737, to which the United States contributed £9717. (It may be remarked that at this period none of the Fencing Wire in which

America now does such a big business was on the market.) Ten years later, 1897, the imports increased to £910,629, the American trade in the meantime having jumped from £9717 to £94,905, Wire Fencing being valued at £31,598. The German exports to South Africa during the same period advanced from £1618 (chiefly Wire Fencing) to £69,541. In the meantime Belgium had entered the market to the extent of £27,434. Great Britain's trade was £703,715. It will be seen, therefore, that while the increase of American trade with South Africa is gratifying, it is as yet but a very small proportion of that done by Great Britain. From the statistics it is evident that Wire Fencing is an important item. How far this is due to preparations for the war and how far due to the increasing agricultural operations I cannot say. In 1897 £112,574 worth of Wire Fencing was imported into Cape Colony. Belgium, Germany and America supplied £51,726 worth and Great Britain £57,486. I am strongly inclined to think, however, that of the proportion sent by Great Britain certain quantities are of American origin. The Wire Fencing sent to Natal was chiefly supplied by Americans, there being a difference in their favor of 10 per cent. in the price. It is interesting to observe that if an order for Fencing Wire goes to a London commission house American or German Wire is sent unless the British make is specified. Barb Wire is another department in which Americans have now got a foothold. A South African merchant states that he wrote to a large English firm on the subject of their price of Barb Wire, and received a reply to the effect that it did not pay them to reduce their prices, because their particular brand enjoyed a high reputation, and they preferred to sell 50 tons in South Africa at a high price than 500 tons per month at competing prices. German and American competition have made them change their policy and quote lower rates. In the matter of standards for Wire the difference between English and American on the South African market is 15 shillings a ton in favor of the American. In other classes of Wire some consumers say they will only take British, even if it costs but 1 or 2 shillings more, because it stands the strain better. The Wire Nail trade is now entirely in the hands of Americans and Germans, both on the score of price and utility. "We still get," says a large dealer, "a few English Wire Nails, Flooring Nails, Brads, &c., but even these in quantities, if not decreasing, are at any rate not increasing with the increase of the Nail trade." Another storekeeper, asked why English firms could not supply Wire Nails at the same price as the Americans, could give no answer. He added that all Nails should be packed in boxes and not in wood kegs, as the former are more tidy and convenient and less bulky in the store. The boxes should be marked on the ends with the size of the contents. A Queenstown merchant thus states his reasons for giving out orders to Americans:

My firm's imports, other than British manufactured goods, consist principally of Barb and Steel Wire, Tools, Agricultural Implements, Building Material, Joinery, Lampware and food stuffs, such as potted meats, fruits, cereals, &c. Most of these we import from America. For many years we imported English Wire and Tools exclusively, but we found we could not compete with houses getting American goods. The British manufactured goods are on the whole preferred, but we are not prepared to pay from 10 to 15 per cent. more for these. To-day the whole of our orders for Barb and Steel Wire go to America. The American Tools, although not perhaps as durable as the English manufacture, have a better finish and command a more ready sale. With reference to packing, we find the Americans study economy as regards space, and most of their goods are packed in wooden cases free of charge. Speaking generally, our orders receive better attention and more prompt dispatch from America. In Hardware lines it is often six, nine and sometimes twelve months before we can get delivery from England, while we can reasonably expect supplies from America within from three to four months.

#### Hardware in Johannesburg and East London.

As Johannesburg is likely to be the commercial metropolis for South Africa at some future date, I venture to reproduce the following notes made by a Johannesburg merchant. They throw a flood of light upon the actual position of America, Germany and England, so far as Hardware is concerned:

*Axes.*—With the exception of Side Axes nearly all sold here are American.

*Hammers.*—American make are commonly preferred. Drilling Hammers are English. A polished American Hammer long, held the market, but the English knocked it out.

*Emery Wheels* come entirely from America, both for wet and dry use. Americans are now making a wheel which can be used for other purposes.

*Pipe Screw Machine.*—There is one sold here bought in London, but evidently of Continental manufacture. It is much cheaper than English; but the English machine must also be stocked. The English should make a machine of the same grade and price.

*Scales.*—Many big Scales we get from England, but the Americans make small ones much cheaper than English.

*Brooms and Brushes.*—Most of the smaller Brushes come from England, but the Americans supply a flat sweeping Brush, pretty and useful, at a very cheap rate, wholesale 18 shillings a dozen, retail here 2 shillings or 2 shillings 6 pence. The same kind of Brush is made in Venice.

*Pumps.*—In small Pumps the market is chiefly in the hands of Americans.

*Finishing Nails.*—The English manufacturers will not make these equal to the American. There is not the same thinness and finish so necessary for panel work.

*Horseshoe Nails* of superior quality are bought in England, but they are of Swedish make; indeed, the package shows that they were pointed and finished in Sweden.

*Spear Head Railings.*—Stamped out of the solid and capably finished, they are supplied by Germany a trifle cheaper than from England. Still, some English rail heads are sold.

These notes really synchronize with similar notes from merchants in Durban and East London. From East London I extract the following information:

*Chisels.*—The English manufacturer must make a lighter and better looking Socket Chisel, as the American product is preferred on this ground.

*Hammers.*—American Hammers are the most popular. Canada has lately sent some Hammers to the South African market, but the business done in this trade by Canadians is as yet small.

*Pliers.*—The English manufacturer should finish the Pliers he sends out better; at present they suffer by comparison with the German made article. Wire Cutters and Pincers combined command a big sale, which British manufacturers should have a greater share in; but this result will not ensue until a more attractive article is turned out.

*Anvils.*—I noted with gratification that practically the whole of the Anvil trade is in the hands of British firms; and, judging by the experience South African merchants have had of American Anvils, it is likely to remain so. A recent consignment of American Anvils, in especial, turned out more unsatisfactorily, and will considerably discount any further efforts which may be made to oust the British article.

*Vises.*—There is a large demand throughout the country for Parallel Vises of the "instantaneous grip" type. The trade is at present mainly British; but Americans are striving to get a larger slice of it by introducing an article of considerably more finish than the British Vise. I think that if the home manufacturer continues to give the same quality and can see his way to make a slight reduction in price his position will remain secure.

In addition to the foregoing lines of goods, I may remark that Disston's Saws are the favorite. Wood Planes nearly all come from England, but Iron Planes are all American.

#### Some Current Prices.

Some idea as to prices obtaining up country can be obtained from figures given by a Ladysmith trader. He states that Iowa Barb Wire costs, delivered on rail in Durban, 14 shillings 9 pence and 5 per cent. per coil of 1 hundredweight. American Bit Stock Drills cost 1 shilling 8 pence each plus 10 per cent. Tin Frying Pans, 7 shillings 6 pence and 5 shillings 3 pence plus 10 per cent. The Mascot brand of Galvanized Iron costs 15 shillings 6 pence less 5 per cent. per hundredweight at Durban. A Washing Board largely in use is delivered at inland towns from 17 cents up, according to rillage. It is not faced with metal.

#### Where Americans Fail.

From what I have already noted, it would seem as if Americans are winning all along the line. They are doing nothing of the sort. For example, the Tinware trade is entirely British. Again, English manufacturers are advised to continue making their Galvanized Iron Buckets of strong material, as the American has been flooding the market with his products and giving the very greatest dissatisfaction on account of their very weak construction. An instance is quoted in which a big storekeeper took an American Bucket in his hands and crushed it together as if it were a piece of cardboard. The English Bucket costs nearly three times the price of the American, as 1 shilling 9 pence is to 4 shillings 6 pence, but is none the less preferred, owing to

its stiff, strong make. It can be given to the Kaffirs for use, and notwithstanding rough handling has a long life. A Johannesburg importer told the commissioner that some English houses thought they had made a stride forward in the South African market when they sent out Pails minus the iron hoop at the foot. As a matter of fact, this was suicidal. The life of the Pail is considerably shortened, as customers soon discovered. The same Johannesburg trader states that the American had sent him a lot of their kind of Pail, perpendicular sides, not good to look at. In connection with Buckets a hint is given worth following up. The Buckets are usually sent stacked in one another in dozens. The lower Buckets are always more or less damaged by the rivets wearing a hole through the side with the pressure; therefore, some kind of wrapper ought to be placed around each Bucket before it is packed. Another line of goods in which the Englishman easily holds his own is that of Spades and Shovels. There is an enormous trade done in South Africa in this line. I read that the Americans have made several efforts to gain the trade, but have failed, chiefly in the matter of price and owing to their method of packing. Curiously enough, it is unusual to find American manufacturers failing in this respect. The commissioner says that in South Africa it is considered that the American understands and practices the art of packing in the smallest possible space and with the maximum degree of safety better than the manufacturer of any other country. And yet in this particular department he has failed. Hitherto he has put up these lines for transport in wood packing cases, which occupy a lot of room and materially add to the freight, whereas the British manufacturer sews up the Spades in a rough canvas. It is further stated that the quality of the British Spade and Shovel is admirable and highly appreciated. A hint is given to the effect that manufacturers should study the question of the most comfortably handled, well finished and cheapest Spade, with a view to holding this market. At a meeting of traders the desirability of sending all Spades sharpened was discussed. It was feared by some that if this were done the edges would get damaged in transit. Others contended that as grinding facilities in the interior of the country were inferior the Spades ought at all risks to be ground at home. No conclusion on the matter was reached, but a distinct suggestion is contained in the discussion. In electro plate the Americans are not in it with the English. A partner in a big Johannesburg firm said:

"We did a certain amount of American plate, but their trade in this has declined. The American goods are more showy, but the British are the best and more appreciated by British people. If they continue to reform as of late they will hold this market, but there must be no slackness, and they must endeavor to ascertain wants in price, &c., and meet them." Another merchant said: "English electro plate is far and away the best. It gives tone to an establishment, whether home or business. It costs more but it lasts a great deal longer, always looks wells, is well made, and altogether satisfactory. No one who knows his business buys German or other foreign silver plate."

Another line which Americans have completely failed to capture is that of Enameled Ware.

#### Saws

Having thus given some general information upon Hardware trade in South Africa, I note some special observations upon lines which Americans, to some extent, have made their own. And first I refer to Saws. The question of the brand is raised here, and it is worth noting that a good brand has exceptional value in South Africa. On this point the commissioner says:

Great is the virtue in South Africa of a well-known brand. When a manufacturer has established a reputation for excellent quality and value here, he reaps a rich reward. People live too far from places where goods are sold to venture on experiments, and once they have discovered an article which they think is the best of its kind they stick to it, sometimes even after its quality has declined and a competing firm has placed on the market something better at a cheaper price. Somebody's brand of soap, somebody's Paste or Polish, Saw, Axe or Knife confronts one everywhere. In the remoter districts among the Boers the name of the favorite brand has been known to displace the name of

the article, and in these cases the task of the competitor is almost hopeless. It is this that helps largely to retain British trade, and it will continue to operate if British manufacturers will see that their established products remain foremost in excellence.

The brand in the matter of Saws is undoubtedly "Disston." Customers ask for a Disston as a matter of course. Complaint is made that Saws are sometimes sent to up country stores unset. It is important to remember that purchasers in these out of the way places want to use their Saws at once. The same remark, of course, applies to other Tools. Some Carpenters' Tools even now are unsharpened, which makes them easier to pack and handle without damage, but it is a mistake in tactics. The manager of a Johannesburg store stated to the commissioner:

I know of only one English firm who can compete with the American Saws on level terms, and theirs is a good tool; but unfortunately the public, which controls the matter, has grown to prefer the American Saw, and though we stock the other there is a comparatively small sale for it. I dare not throw up the American, although there is nothing to prevent me trying to sell the other, for the demand for the former is fixed. The English firms should have waked up earlier, before the Americans secured the market. It is easier to lose trade than to regain it. Slackness on the part of the English firms and energy on the part of the American has created the present situation.

#### Stoves.

It is no easy matter to supply South Africa with Stoves on account of the great differences in fuel. All kinds of good and bad coal, large and small, wood and turf in different parts of the country must serve as fuel. The Stove to meet requirements must therefore be able to give good results under trying conditions. It must be economical, reasonable in price, with labor saving devices, occupy small space, be easily fixed and possess good selling points. The Pearl type of American Range is the favorite. I note here that a merchant in the Transvaal recently gave an order for 1000 of these for immediate shipment. This is interesting, because I made the same announcement some months ago in *The Iron Age*. That there is to be keen competition in the Stove trade must be recognized by American makers. They have been successful up to now, but the Scotch makers are on their track, and have already won back much trade. The American Stove is to be seen everywhere. The French Stove also threatens keen competition. It has certain features which strongly recommend it to users in South Africa, and as the main agencies are held by wealthy firms with numerous travelers, it is not surprising to learn that the sale of this French Stove, despite its comparatively high price, is rapidly increasing, especially in Cape Colony. French Stoves were also observed in East London, Port Elizabeth and Cape Town. A photograph is given of this Stove in the report, and I would advise American makers to procure it without delay. The chief point apparently in favor of the French Stove is that while it sells at a comparatively high price—£9 to £11—its consumption of fuel is small. In a Stove of this type 5 tons of chopped wood per annum suffices, while some Stoves, smaller in size, will consume as much as 2 tons per month. The Scotch makers are doing an increasing business. Their most popular Stove is built practically on the model of the American, and its cost, without utensils, is 70 shillings, delivered in East London, packed in crates. The firm place any name on the Stove the retailer in South Africa desires. In Oil Stoves the British have more popular lines than the Americans. So far as I can gather from this report, although it is not definitely stated, there is practically no demand for Gas Stoves. The South African traders are greatly struck with the courtesy they have experienced when visiting America, particularly among the Stove manufacturers.

In my next letter I will make further reference to this report.

McGuire & Lyke, Hardware dealers, Johnstown, N. Y., finding their present quarters inadequate, have leased the rear half of the adjoining premises, thus materially enlarging their establishment. This firm commenced business last May, so that they have evidently met with a good deal of success for a new firm.

**CUMBERLAND FOUNDRY & MFG. COMPANY.**

**C**UMBERLAND FOUNDRY & MFG. COMPANY, Nashville, Tenn., who commenced business in June last, are manufacturing a line of Hardware Specialties, Structural Iron and a ball bearing Corn Sheller. They also make all kinds of Railroad Castings. The Advance Ball Bearing Corn Sheller, which they are putting on the market, is referred to as a radical departure from all other Shellers. In this Sheller the knives rotate around the cob, which with the use of polished tool steel balls makes it a very quick, light running and durable machine. By a unique arrangement of the corn chute the spoiled grains can be thrown away without stopping the shelling. The machine, it is stated, will shell from 15 to 20 bushels per hour with ease, owing to the speed with which it is turned. The Sheller is 24 inches long, 13 inches high, 10½ inches wide, with a 13½-inch fly wheel, and weighs 40 pounds. The company have doubled their capacity since starting, and purpose putting in another cupola, on which, complete with blower, they are desirous of having quotations from manufacturers.

**LALANCE & GROSJEAN MFG. COMPANY'S INCREASED FACILITIES.**

**L**ALANCE & GROSJEAN MFG. COMPANY, 19 Cliff street, New York, have just purchased an additional tract of land adjoining their property in Harrisburg, Pa., on which their large rolling mill plant stands. The new property contains about 8 acres, the original plot covering an area of 12 acres. The new property has been acquired for the purpose of increasing their facilities for producing rolled plates used in their extensive factories at Woodhaven, L. I., where they are formed into many kinds of cooking and house furnishing utensils in Agate Nickel-Steel Ware, other Enameled wares, Tin and Galvanized Articles, &c. The plant is being run day and night with two shifts of men at Woodhaven, and they contemplate operating the works Thanksgiving Day, if the men are willing to work, although this season of the year is usually considered a dull one on account of trade running to goods of a more pronounced Christmas character.

**S. D. KIMBARK COMPANY.**

**T**HE S. D. KIMBARK COMPANY, Chicago, Ill., have incorporated under the laws of Illinois with a capital stock of \$650,000. The incorporation was effected to perpetuate the business of S. D. Kimbark, who has been dealing in Iron, Steel, Nails, Carriage and Heavy Hardware Material for upward of half a century. In 1873 Mr. Kimbark entered the employ of E. G. Hall & Co., and in 1858 was admitted a junior partner of the firm. In 1867 the firm name was changed to Kimbark Brothers & Co., George M. and Daniel A., brothers of Seneca D., being admitted to partnership. In 1876 Seneca D. Kimbark became sole proprietor, and since that time the business has been conducted under the name of S. D. Kimbark. During the great fire of 1871 Mr. Kimbark was a heavy loser, but within a week had resumed business at temporary quarters erected on the lake front. A meeting of the stockholders will be held in a few days. S. D. Kimbark will be president of the new corporation and will direct the policy of the business in the future, as he has done in the past, but will probably take a less active part in the management than heretofore.

**BELMONT STAMPING & ENAMELING COMPANY.**

**B**ELMONT STAMPING & ENAMELING COMPANY, lately organized, have decided to locate their plant at New Philadelphia, Ohio, and will commence its erection at once, and hope to have it ready for operation about May 1, 1903. The different buildings will contain about 60,000 square feet of floor space, and will be of brick, all one story in height.

**TRADE ITEMS.**

**O. CHAN WELLS**, 26 Cortlandt street, New York, has been elected president of the Lowber Company, 45 Dey street, New York, who deal in Machinists' Supplies. Mr. Wells has been a director in this company for some years, his elevation to the presidency resulting from the death of D. A. Lowber, former president, who died November 3. This new duty will not alter or change in any way Mr. Wells' relation to the interests he has represented for years.

**A. H. WARNER & Co.**, Bristol, Conn., manufacturers of Metal Key and Lock Faucets, whose factory was burned recently, have leased the plant formerly occupied by the Codling Mfg. Company, in the same city.

**PARTIES** connected with the Baum Iron Company, Omaha, Neb., have purchased of C. E. Faeth, Sioux City, his interest in the Hardware business previously owned jointly by the principals in the transaction. Hereafter the management of the Chas. E. Faeth Company of Sioux City will be in the hands of C. B. French, who was interested with Mr. Faeth in the conduct of the business from its early beginning. The policy of the Baum interests will be as heretofore, to leave entire control of each branch house with its local manager without restraint, each house making its own prices.

In a recent test of sound proof partitions conducted by Prof. Charles L. Norton of the Massachusetts Institute of Technology, Boston, Mass., the sheathing quilt lined with seaweed made by Samuel Cabot, 70 Kilby street, Boston, Mass., took first honors in competition with 12 other insulating materials made by different concerns. In connection with the Cabot room there were three walls or partitions, one of them with three thicknesses of Cabot quilt and metal lath being rated at 100, the other two with two thicknesses of quilt and metal lath getting a rating of 95 each. The other partitions insulated with various materials, such as Wall Board Paper and Metal Lath, Terra Cotta Blocks, Keystone Blocks, &c., graduated from 85 down to 30 in the comparative scale of efficiency as determined by a thorough and scientific test.

**THE STUDEBAKER BROS. MFG. COMPANY**, South Bend, Ind., will shortly send to Manila what probably will be the first American shipment of Steel Signs for advertising purposes ever sent to the Philippines. These Signs are the product of the Gunning System Steel Sign Works, Chicago, Ill., and are claimed to be the only Metal Signs that will stand the peculiar climatic condition of that far away region. The process under which these Signs are manufactured produces an attractive result, with the added features of durability and inexpensiveness.

**THE FLETCHER ALUMINUM COMPANY**, Springfield, Mass., have recently been organized and are manufacturing a general line of Aluminum Novelties. Their specialty is Drawn Boxes, a leader among these being a Photograph Top Box.

**REQUESTS FOR CATALOGUES, &c.**

*The trade are given an opportunity in this column to request from manufacturers price-lists, catalogues, quotations, &c., relating to general lines of goods.*

**Seneca Hardware Company**, Seneca, S. C., will open up in business January 1. They will handle General Hardware, Stoves, Tinware, Roofing, &c., and will value catalogues and other printed matter pertaining to these lines.

**J. Bolles & Son**, Hardware merchants, Naples, N. Y., are desirous of receiving catalogues and price-lists of Gas Ranges, Lamps and Fittings.

**J. W. Dennison**, formerly in the Bicycle business at Brockton, Mass., has just opened a retail Hardware store. The store, which has two large plate glass windows, has been fitted up in first-class shape. Later Mr. Dennison will put in Window Glass and Paints and Oils. He also expects to handle Bicycles. Catalogues and price-lists will be appreciated.

## PRICE-LISTS, CIRCULARS, &amp;c.

CHICAGO SPRING BUTT COMPANY, Chicago, Ill.; New York office, 97 Chambers street, issue a pamphlet of revised lists. These lists are to be substituted for lists in the company's complete catalogue of January, 1901, or March, 1902.

THE RIPLEY HARDWARE COMPANY, Grafton, Ill.: Illustrated catalogue and price-list of Feed Cookers, Sprayers, White Washing Machines, Steel Tanks, Fancy Poultry, Cattle and Sheep Breeders' Supplies.

DANA & Co., Cincinnati, Ohio: Illustrated catalogue describing the Peerless Iceland One-Motion Freezers, which are made for both hand and power. The latter are made in 25 and 40 quart sizes. The firm are now manufacturing Fly Wheels for all sizes of their Freezers from 2 to 25 quart.

THE WILLIAM CONNORS PAINT COMPANY, Troy, N. Y.: Two artistically printed folders, with dark covers, devoted to their line of Paints, Colors, Cements, Putty, &c. The company's goods are known under the name of American Seal Paint.

THE UNITED STATES PAINT COMPANY, Williamsport, Pa.: Catalogue containing sample cards of the company's line of Ready Mixed Paints. The company also manufacture Prepared White Lead and Red Lead, Metallic Graphite, Carbon and Asphaltum Paints for all purposes.

THOS. MILLS & BRO., 1301-1309 North Eighth street, Philadelphia, Pa.: Ice Cream Manufacturers' Tools. An illustrated catalogue is devoted to these goods; also to the firm's specialties, which include Confectioners' Tools, Bakers' and Cooks' Tools, Dairymen's and Milkmen's Supplies.

GRATON & KNIGHT MFG. COMPANY, Worcester, Mass.; New York store, 40 Dey street: Tanners of Oak Leather and manufacturers of Belting. An illustrated catalogue and price-list is devoted to Belting, Belt Dressing, Straps of all varieties, Halters, Horseshoe Pads, Washers, Counters, Insoles, &c. The catalogue also illustrates goods of the Western branch of the Voorhees Rubber Mfg. Company, which the company sell.

BUTLER BROTHERS, New York: The monthly condensed edition of "Our Drummer, No. 443," for December, 1902. This contains 292 pages, bringing their unabridged catalogue No. 434 up to date.

P. & F. CORBIN, New Britain, Conn.: "The Corbin" for November is an interesting number, illustrated and printed in the usual attractive manner.

JOHN C. KUPFERLE, St. Louis, Mo.: Catalogue No. 2 devoted to the Eclipse and St. Louis Reversible Shoe Stands and Lasts, Lap Lasts, Shoe Hammers, Foot Rests, Nail Cups, Saw Clamp and Vise, Lap Irons, &c.

E. C. BROWN & Co., Rochester, N. Y., New York and export office, 35 Broadway: Spray Pumps and Attachments. Catalogues call especial attention to the Auto-Spray, which is also handsomely illustrated on posters.

THE AUTOMATIC FILE & INDEX COMPANY, Green Bay, Wis.: The Automatic Letter File and Banner Sectional Cabinet. These are illustrated and the advantages explained in the company's catalogue.

THE CARLISLE & FINCH COMPANY, Cincinnati, Ohio: Catalogue B, No. 7. Electrical Novelties and Experimental Apparatus, Dynamos, Motors and Gas Engines. The Motors for toy railroads are made stronger and better, and the cars are of better design than formerly. Their No. 30 Magneto Dynamo and their Igniting Dynamo, with belt tightener, are also referred to as having been improved and changed.

THE CLEVELAND GALVANIZING WORKS, 18-24 Cooper street, Cleveland, Ohio: Catalogue illustrating and describing the Standard Butter Cutter. The company present the Butter Cutter in improved form for the use of creameries, commission men and grocers. The Cutter is also recommended for cutting butter for printing.

THE ACME WHITE LEAD & COLOR WORKS, Detroit, Mich., issue a monthly periodical, under the name of "Spatters," devoted to the interest of employees, friends

and customers of the concern. The pamphlet contains eight pages of reading matter and illustrations, well printed and artistically bound in tinted paper covers.

TOWNSEND & THOMPSON, North Manchester, Ind.: Singletrees, Doubletrees, Tripletrees and Neck Yokes. An illustrated descriptive catalogue calls attention to the fact that only thoroughly seasoned hickory is used; that the clips are shrunk on, the iron japanned, and that a good grade of slow drying varnish and paint makes the goods less liable to rust and scratch.

THE FRANK MOSSBERG COMPANY, Attleboro, Mass.: Illustrated catalogue and price-list devoted to Wrenches, Bicycle and Automobile Bells. The catalogue illustrates five new Wrenches. The company are distributing two hangers, in colors, one devoted to Bicycle Bells, Automobile Bells and Sheet Metal Novelties. The other one relates to the line of Wrenches manufactured by the company.

BALDWIN REFRIGERATOR COMPANY, Burlington, Vt.: Catalogue of 88 pages, showing the line of Baldwin Refrigerators for 1903. The company manufacture about 140 styles and sizes in hard and soft wood, metal, porcelain and spruce lined. They refer to the quality and design of their goods as having been materially improved, and also to the increased facilities afforded by a new and enlarged factory equipped with the most approved machinery.

S. L. ALLEN & Co., Philadelphia, Pa.: Planet, Jr., Farm and Garden Tools. These include Hill and Drill Seeders, Double Wheel Hoes, Horse Cultivators, Beet Hoes, Celery Hillers, &c. These and other Tools are shown in the firm's 1903 catalogue. Improvements have been made in a number of regular Tools, and a new Five-Lever Cultivator, No. 72, is offered for the coming season.

THE R. E. DIETZ COMPANY, New York: Lanterns and Lamps. Catalogue No. 33 illustrates, with prices, Lanterns, Street, Driving, Motor and Bicycle Lamps, Locomotive Headlights, Commercial, Railroad and other Lanterns.

THE C. S. SMITH MFG. COMPANY, sales agents, Wagner & Marshall, 40 Dearborn street, Chicago, Ill.: Hardware Specialties, Sheet Metal Stampings, Door Hangers and Track. An illustrated catalogue and price-list is devoted to Parlor and Barn Door Hangers, Track, Stay Rollers, Foot Scrapers, &c.

THE MIDLAND IRON WORKS, Racine, Wis.: Illustrated catalogue relating to the Wilber Adjustable Barn and Factory Door Hangers and Racine Fire Door Hangers.

BUTTERFIELD & Co., Derby Line, Vt.: Illustrated 1903 catalogue relating to Stocks and Dies, Solid Die Plates and Reece's Screw Plates. Particular mention is made of new numbers and sizes of Derby Screw Plates. The company are about completing a new factory 126 feet long, three stories high, with a total floor space of 17,000 square feet.

THE LEA ELECTRIC COMPANY, Elwood, Ind.: Illustrated catalogue of novelties in Arc Lamps, including alternating and direct current, standard and miniature, with swinging covers.

THE STEEL WAGON COMPANY, Pueblo, Col.: Illustrated catalogue of Steel Wheels, Steel Wagons, Steel Gears and Pressed Steel Wagon Beds.

KNAPP & SPENCER COMPANY, Sioux City, Iowa: Want Book, containing revised price-lists of standard list goods. The book is supplied with a cord for hanging and is designed for entering memoranda of goods necessary to purchase.

THE PAPEC MACHINE COMPANY, Lima, N. Y.: The Papec Ensilage Cutter is illustrated and described in a catalogue.

CORDLEY & HAYES, 172 Duane street, New York sole agents for Fibrotta Indurated Fiber Ware: Circular matter illustrating their Twentieth Century Ice Cream Freezers, which freeze cream without a dash or revolving can, together with Ice Water Receptacles, Rolling Stands for potted plants and many other articles in Fiber Ware.

## NINTH ANNUAL SPORTSMEN'S SHOW.

**P**REPARATIONS are well under way for the ninth annual Sportsmen's Show, to be held under the auspices of the National Sportsmen's Association, in Madison Square Garden, New York, Saturday, February 21, to March 7, 1903, inclusive, a period of two weeks. As in the past the general manager is Capt. J. A. H. Dressel, 313-317 Broadway, to whom inquiries for information should be addressed, Post Office box 1353, New York. Many inquiries have already been made for space, allotments being made according to date of receipt of application. Trade exhibits, excepting launches, marine engines and motors, will occupy space in the gallery, the three important lines mentioned occupying space on the main floor. The show of 1902 is regarded as the most attractive and successful of the series, but the management are endeavoring to enlarge upon and improve the details of the coming display with a view to surpassing any previous effort. As heretofore fly casting, rifle and revolver contests, never failing sources of interest to both the general public and sportsmen, will be held under the management of competent people. There will also be other features, which are expected to draw sportsmen and their friends to the Garden in greater numbers than ever.

## BUFFALO WHOLESALE HARDWARE COMPANY.

**T**HE BUFFALO WHOLESALE HARDWARE COMPANY, Buffalo, N. Y., have been incorporated with a capital of \$250,000. As their name indicates, the company will carry on an exclusively wholesale business. The incorporators are the following: Chas. H. Smith, Sheffield, Pa.; Flavius C. Smith, Ridgway, Pa.; William P. McClure, Warren, Pa.; John P. Becker, Erie, Pa., and Edgar C. Neal, Newell A. Taber, Henry Machmer, Albert W. Weaver and William M. Thompson. This company is the outgrowth of the manufacturers' and jobbers' agency business begun by Edgar C. Neal July 1, 1901, who, in November of the same year, was succeeded by Neal, Taber & Weaver. The Messrs. Smith are wholesale grocers and Mr. Becker is a former Buffalonian, who was at one time associated with Mr. Neal in the Hardware trade. The new concern have leased the old Walbridge Building, at Washington and South Division streets, for a long term of years.

## NATIONAL SWEEPER COMPANY.

**N**ATIONAL SWEEPER COMPANY, Marion, Ind., for the purpose of promoting the sale of their Carpet Sweepers, are furnishing free to their customers a series of electrotypes for use in their local newspapers. Each electrotpe brings out some special advantage of their National Carpet Sweeper. The cuts are single column in width and about 3 inches in length and have a strong and catchy tone. In addition to the advertising cuts they furnish a series of hangers reproducing them in colors, and also large sheet posters in colors for outside work, carrying out the same ideas. Thus, the company remark, people on opening the newspaper at home see these advertisements, upon going into the street they see the same thing on a larger scale on the billboards, and going into the store they encounter it again in the hangers. The company express confidence that their campaign of publicity will meet the approval of enterprising merchants.

O. H. Gunhus has lately opened a Hardware store at Everett, Wash., handling also Stoves and Tinware, Ironware, Cutlery, &c. The store is located in the heart of the city and is attractively arranged. Cabinet shelving, manufactured by John D. Warren Mfg. Company, Chicago, Ill., has been installed. Mr. Gunhus would appreciate copies of catalogues, price-lists, &c.

H. A. Steinke is selling out his stock at Wallace, Idaho, and about January 1 will open up at Cœur d'Alene with a complete new stock of Hardware, Stoves, Tinware, Paints and Oils, Fishing Tackle, &c.

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## AMONG THE HARDWARE TRADE.

W. T. Oberst, formerly with Roberts Bros., Alexandria, La., has purchased the business of T. C. Oberst, Blytheville, Ark., which he will continue. Mr. Oberst will erect a new one-story brick structure, 25 x 75 feet, and will carry a line embracing Hardware, Mill Supplies, Stoves and Crockery.

Fire destroyed the Hardware and Farm Machinery building of Peter Meyers, at Wolsey, S. D., a short time since. The loss was \$6000, with insurance of \$600.

F. L. Knight and Charles Heaton have purchased the Hardware and lumber business of H. Worcester & Co., Manchester, Ill., and will continue under the style of Knight & Heaton.

Hubbell & Lisenby, dealers in Hardware, Stoves, Sporting Goods, &c., Springfield, Mo., will move to their new building, 300 South street, December 15. Here, they advise us, they will have one of the finest stores in the State outside of St. Louis.

J. T. Giesy has disposed of his business in Aliceville, Kan., to J. R. Bryant.

Theo. Ostlund & Co. are successors to Theo. Ostlund, at Hillboro, N. D., in the Hardware, Stove and Agricultural Implement business.

H. M. Waterman & Co., Peck, Mich., who carry a general merchandise stock, including Shelf and Heavy Hardware, Stoves, Tinware, Farming Implements, Sporting Goods, &c., have made an addition to their space so as to enable them to carry a larger stock of Shelf Goods and Tinware.

H. A. Griese has bought an interest in the Hardware business of W. H. Buhr, Denver, Iowa, and the style has become W. H. Buhr & Co.

J. L. Zoller, Waucoma, Iowa, who has carried on the Hardware and furniture business for many years, has disposed of his stock to Jacob Lichter, taking in exchange the latter's farm and paying the difference in cash.

London-Stoffel Hardware Company, Mountain City, Tenn., have been incorporated with a capital stock of \$10,000, to carry on the wholesale and retail business in Shelf Hardware, Stoves, Tinware, Agricultural Implements and Mill Supplies.

W. J. Courtney has succeeded W. J. Courtney & Co. in the Hardware, Stove, Tinware and Sporting Goods business in Springville, Iowa. Mr. Courtney will move into a new brick building, 30 x 100 feet in dimensions, about the first of the year.

William Robertson, Cozad, Neb., has added a general line of Hardware to his former furniture stock.

M. S. Hart & Co. have succeeded Hart, Wallace & Co. in the Hardware and Stove business in Bardstown, Ky., John Wallace having disposed of his interest.

J. R. Alford, New London, Mo., has purchased Joseph Elliott's Hardware, Stove and Farm Machinery stock and consolidated it with his own.

Thomas E. Morgan has commenced business in Starkweather, N. D., handling Shelf and Heavy Hardware, Stoves, Tinware and Sporting Goods.

Hans Nelson has lately begun business in Fergus Falls, Minn., handling a line embracing general Hardware, Tinware, &c.

H. M. Bugbee, Hardware, Stove and furniture dealer, Dawson, Iowa, has been succeeded by Bugbee & Tolle.

Wilson & Nagle have been succeeded in the Hardware and Stove business in Mechanicsville, Iowa, by Wilson & Carpenter, who are building a new warehouse and putting additional shelving in store.

The Cole Hardware Company, Bryan, Texas, have been incorporated with a capital of \$25,000. The parties interested are M. D., J. N., N. B., W. H. and C. M. Cole and J. E. Corey. The company will conduct the wholesale and retail business in Shelf and Heavy Hardware, Stoves, Tinware and Agricultural Implements.

Buchanan & Lincoln, dealers in Hardware, Stoves, &c., Curtis, O. T., have been succeeded by Ingraham & Lincoln.

J. C. Crossett is successor to J. L. Brink in the retail Hardware, Stove and Sporting Goods business in West Concord, Minn. Mr. Crossett has removed to a new brick block, where he is able to carry a much larger stock than has heretofore been the case.

Theodore Smith has sold his half interest in the Hardware firm of McDougal & Smith, Tecumseh, Neb., to John McDougal, and the business will be continued under the style of McDougal Bros.

E. G. Behrhorst has succeeded Rahmire & Behrhorst in the Hardware, Stove, Implement and Vehicle business in Sylvan Grove, Kan.

Ray & Coleman have succeeded T. F. Ray & Bro. in the wholesale and retail business in Poplar Bluff, Mo. The lines carried include Hardware, Stoves, Cutlery, Woodenware, Tinware, furniture, Paints, Oils, Lamps, &c.

## MISCELLANEOUS NOTES.

### The Four-Blade Summit Lawn Mower.

The Elwood Lawn Mower Company, Elwood, Ind., have added to their line of lawn mowers the Four-Blade Summit. The wheels are 8 inches high and the reel 5½ inches in diameter. It is referred to as being built of high grade material and being of first-class workmanship. It is, however, very light and does not require as much material nor as much time to build as some of their other mowers, and is proportionately lower in price. The shaft has a solid, permanent bearing in a split brass box, set in the side frame, and the cutter bar adjusts to the reel. The same ball ratchet is used on this as on their other mowers.

### Holophane Illuminating Globes.

The Holophane Glass Company, 15 East Thirty-second street, New York, manufacture what are known as Holophane globes, suitable for electric lights, acetylene, Pintsch and ordinary illuminating gases, kerosene lamps, &c., in a great variety of styles and sizes. These globes are made of a colorless, transparent glass of uniform quality, which is pressed and annealed to produce toughness. The globes have vertical prismatic ribs on the interior and horizontal prismatic ribs on the exterior. The interior ribs are visible and the surface of the globe appears to be divided up into prismatic points arranged in regular order.

### The Nevershed Lather Brush.

The Thompson Mfg. Company, Troy, N. Y., are offering lather brushes which they refer to as wearing to the ferrule without shedding bristles. It is pointed out that there is no twine to foul, no iron or brass to corrode, no horn to crack, no bone to split and that the brushes are practically indestructible. The brushes are put together with water proof cement under heavy pressure, and have sterilized odorless French bristles, with aluminum ferrule and ebonoid handle. The brushes are furnished in four styles: Nos. 1, 2, and 10, all bristles, and No. 15 bristles and badger hair mixed.

### The Porter Hinged Barn Door Hanger and Track.

The accompanying cuts relate to a hinged barn door hanger and track offered by the J. E. Porter Company,

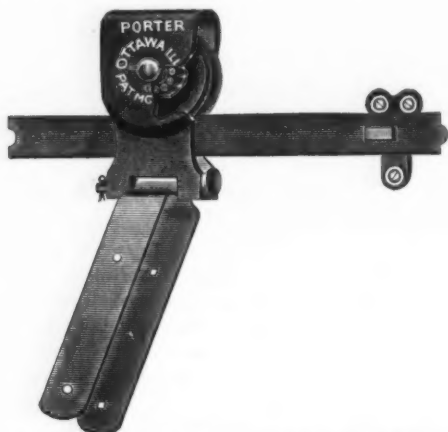


Fig. 1.—The Porter Hinged Barn Door Hanger.

Ottawa, Ill. The hanger proper is made of malleable iron and the door strap of steel. The flange of the wheel in combination with the lower track guide is de-

signed to prevent any possibility of the roller jumping the track or in any manner being thrown off. The hanger and the door strap are connected by a loose malleable pin, which produces the hinged effect. This is referred to as of great advantage in hanging doors, as the track and hangers can be placed in position, the door straps attached to the doors and the connection made by slipping the pin through the lower part of the hanger and the loop of the door strap. Doors can also be removed with equal ease without disturbing the door straps. The track, Fig. 2, is made of  $1\frac{1}{4}$  x 3-13 hard Bessemer steel, with brackets or supports riveted through the track every 16 inches. The track is alluded to as being rigid, strong and substantial. The company have just designed a handsome folder, printed in colors, fully describing their hangers and track, which will be furnished to dealers on application.

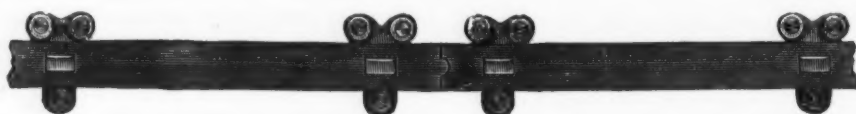


Fig. 2.—Track for Porter Hinged Barn Door Hanger.

signed to prevent any possibility of the roller jumping the track or in any manner being thrown off. The hanger and the door strap are connected by a loose malleable pin, which produces the hinged effect. This is referred to as of great advantage in hanging doors, as the track and hangers can be placed in position, the door straps attached to the doors and the connection made by slipping the pin through the lower part of the hanger and the loop of the door strap. Doors can also be removed with equal ease without disturbing the door straps. The track, Fig. 2, is made of  $1\frac{1}{4}$  x 3-13 hard Bessemer steel, with brackets or supports riveted through the track every 16 inches. The track is alluded to as being rigid, strong and substantial. The company have just designed a handsome folder, printed in colors, fully describing their hangers and track, which will be furnished to dealers on application.

### Frasse Power Hack Saw.

The Frasse Company, 38 Cortlandt street, New York, are putting on the market an improved form of the



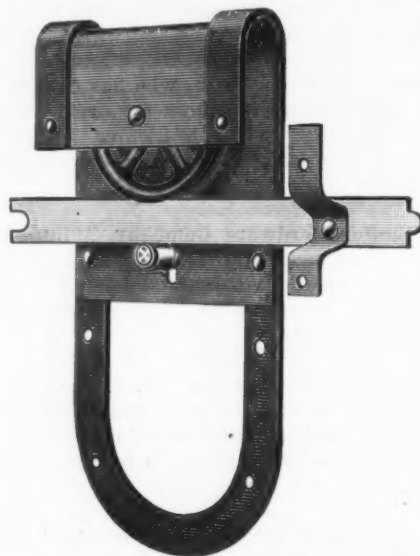
Frasse Power Hack Saw.

Frasse power hack saw, as here shown. Some of the points of excellence to which the company call attention are that the saw when it has cut through the ma-

### The Wagner Adjustable Never Jump Barn Door Hanger.

C. S. Smith Mfg. Company, Milwaukee, Wis., have just placed on the market a new barn door hanger, illustrated herewith. It is referred to as a stay-on hanger which cannot be thrown from the track. It can be adjusted to take any size track from 1 inch to  $1\frac{1}{2}$  inches, inclusive, retaining the stay-on feature. The spool is grooved so as to maintain the same clearance at all

angles within its limits, which will enable a door to swing out 5 to 6 feet with a perfect bearing and without injury to the door or the hanger, the weight of the



The Wagner Adjustable Never Jump Barn Door Hanger.

door bringing it back into place again. The general sales agents for this company are Wagner & Marshall, 40 Dearborn Street, Chicago, Ill.

The Geo. H. Fernald Hardware Company, Sanford, Fla., have been incorporated with a capital stock of \$50,000, and the following officers: Geo. H. Fernald, president and manager; W. C. Temple of Pittsburgh, who is manager of the Cahall Sales Department in that city, vice-president; F. W. Mahoney, treasurer, and H. J. Wilson, secretary. The company will succeed Geo. H. Fernald in the wholesale and retail Hardware, Stove, Agricultural Implement, Builders' Supply, Paint, Oil, Plumbing and Sporting Goods business. Messrs. Mahoney and Wilson have been employed by Mr. Fernald for some time. The company are intending to add a machine shop.

### New Hardware Store Fixtures.

The accompanying cuts represent new store fixtures gotten out by the J. D. Warren Mfg. Company, Chicago. Ill. A portable office is shown in Fig. 1 made of fine oak, 6 x 8 feet in size, with swinging doors on either



Fig. 1.—Warren's Portable Office.

side. The office is of convenient size to be placed in any location desired.

A cabinet for screen wire cloth, shown in Fig. 2, is 8 feet long, 7 feet high and 6 feet deep, open on both sides. The upper portion has 24 round spaces, made of

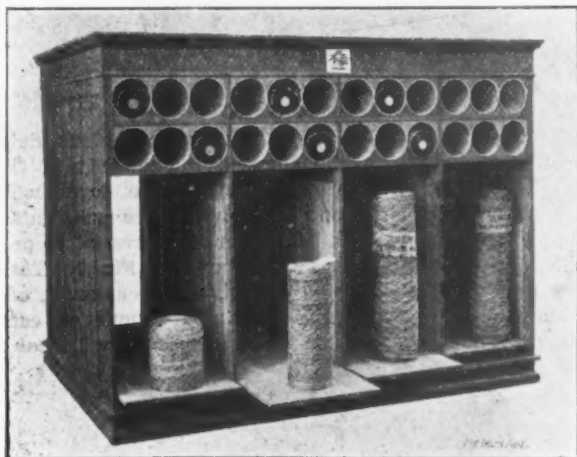


Fig. 2.—Warren's Wire Screen and Netting Case.

galvanized iron, for holding 48 rolls of window and door screen wire cloth. An attachment is provided by the use of which any roll desired may be drawn out. Underneath are spaces for poultry or fencing netting. The netting is placed on movable slides, resting on rollers,

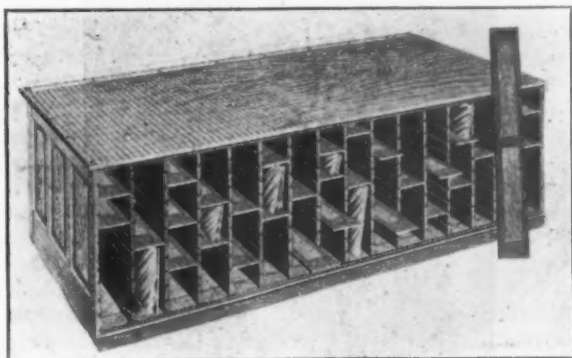


Fig. 3.—Warren's Glass Counter.

which can be drawn out on either side without tilting, the netting being held in place by short upright oak pins fastened to the movable slides.

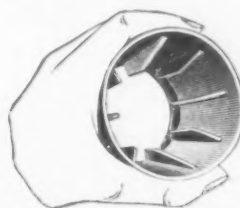
A window glass counter is shown in Fig. 3. This is 8 feet long and 4 feet wide, divided into 5-inch spaces, with grooves 2 inches apart. The grooves extend from front to back and the sliding shelves can be placed any

distance apart to suit the various sizes of glass carried in stock. The counter accommodates any size of glass, from the smallest up to 30 x 50 inches. The top is carefully made of hardwood, so that it will remain absolutely true. On one side is a raised rule, extending the entire length—100 inches—divided into  $\frac{1}{4}$ ,  $\frac{1}{2}$  and 1 inch spaces. At the other end is another rule divided in the same way, extending from one side to the other, these two being at right angles to each other for guidance in cutting. As a further assistance there are black enameled inlaid lines, 1 inch apart, extending lengthwise and crosswise.

The fixtures here described were included in a complete equipment for the new store of the Lewers & Cooke Company of Honolulu, H. I., the outfit requiring several large furniture cars for its transportation to the Pacific Coast.

### The Handy Andy Corn Sheller.

The corn sheller shown in the accompanying illustration is made of one piece of metal, finished in baked japan, weighs 11 ounces, and can be conveniently carried in the pocket. Among the advantages possessed by the

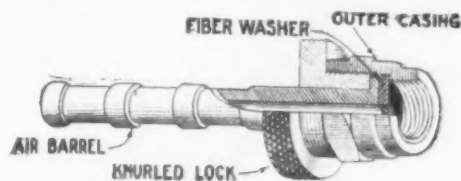


The Handy Andy Corn Sheller.

corn sheller the following are mentioned: That it will shell large or small ears of corn perfectly clean; that it is valuable for butting and tipping seed corn; that while shelling, corn may be scattered for feeding poultry by a swinging motion of the arms, and that if it is desired to shell corn into a basket the corn will pass through the small end of the sheller, a small basket catching every grain. In use the sheller is held in the left hand, in the position shown in the cut, the ear of corn is inserted, giving it a half turn to right and left, pushing lightly on the ear at the same time. When half shelled the cob is reversed. Small ears and small ends are held at an angle to shell all the grains. A smaller sheller is made for pop corn, weighing 5 ounces. The shellers are put on the market by the Lyons Specialty Company, Lyons, Iowa.

### The Perfect Air Coupling.

E. S. Youse, Reading, Pa., Stevens & Co., 90 Chambers street, New York, sole selling agents, is just placing on the market an improved model of the Perfect air coupling, as shown herewith. In the new model the threads are much shorter and the entire device a great deal smaller than the old model. In fact the coupling has been entirely reconstructed with a view of getting



The Perfect Air Coupling.

the threads shorter, as it took considerable time to screw up the old coupling. The manufacturer remarks that while the simplicity of the device is a strong point, its most commendable feature is the manner in which it is threaded to couple onto the external threads of the Schrader, Scoville and M. & W. valves. This avoids the necessity of delicate parts and this feature is referred to as insuring long life to the valve as well as to the coupling. All couplings are turned from solid brass and are guaranteed accurate by the manufacturer.

The coupling is intended for use on automobiles, automobile air tanks and automobile, bicycle and carriage tires.

### Ripley's Perfection Galvanized Steel Hog Trough and Waterer.

The Ripley Hardware Company, Grafton, Ill., are offering the hog trough and waterer shown herewith. It is made of No. 24 galvanized steel, with the exception of the frame in which the trough rests, which is made of 1 $\frac{3}{4}$ -inch plain lumber. It is remarked that it will last for years, as it has no parts which rust, warp or leak. It is portable, so that it can be moved from place to place, for use outside or inside building. It is made in two sizes: 8 feet long, to accommodate 19 hogs, and 4 feet long, for 9 hogs. The trough is constructed so that each hog has its separate stall, so that it cannot get its

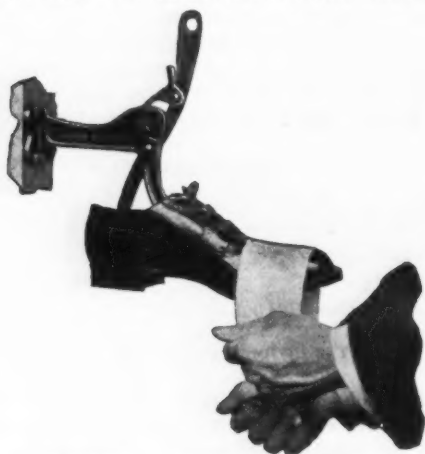


Ripley's Galvanized Steel Hog Trough and Waterer.

feet in the trough, root any of the feed out or interfere with the hog standing next or opposite, nor can a hog lie lengthwise or stand in the trough. The feed is poured in at the top to prevent any being wasted or spilled. It is also divided evenly in the trough, which has a wide wooden base on which the front feet of the hogs rest, which prevents hogs turning the trough over. It is explained that where the trough is used the little hog will get its share of the feed as well as the largest hog.

### Combination Shoe Holder and Shiner.

The American Hardware Mfg. Company, Ottawa, Ill., are placing on the market the shoe holder and shiner, for household use, as illustrated herewith. The lasts are



Combination Shoe Holder and Shiner.

made of cold rolled sheet steel, and the bracket is also made of steel, to render it practically unbreakable. The device is highly finished in oxidized copper or nickel plate, and weighs 3 $\frac{1}{2}$  pounds. It can be adjusted in an instant. There are three lasts: men's, women's and children's sizes, which accompany the device, and in

addition one box of polish, a polishing cloth and a hook, on which to hang the shiner when it is not in use.

### The Wiesbauer Cutlery Box.

The Wiesbauer Mfg. Company, 65 Coal and Iron Exchange, Buffalo, N. Y., are offering the cutlery box shown in the accompanying cuts. The box is made

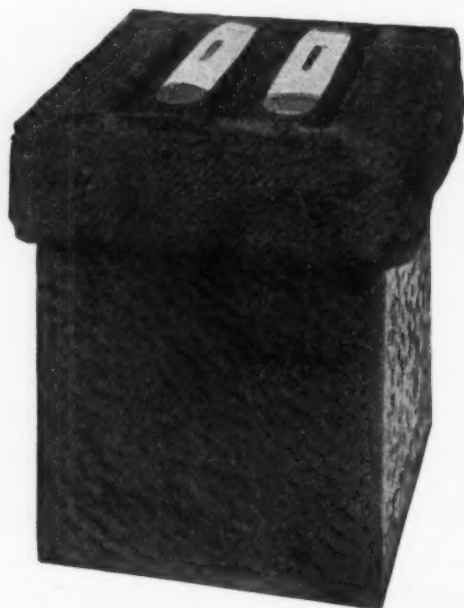


Fig. 1.—The Wiesbauer Cutlery Box.

3 $\frac{1}{2}$  inches high, which brings it up a convenient height from the bottom of the showcase. The body of the box is covered with leatherette, and the cover with silk plush or silk velvet. The cover has a substantial cloth hinge. The top of the cover is depressed to provide space for two samples, as shown in Fig. 1. Thus any number of samples may be shown a customer, one from each box, while the remaining sample on each box prevents any confusion in returning the goods shown



Fig. 2.—Cutlery Box with Cover Partly Open.

to the proper boxes. The boxes are placed side by side in a showcase of any length, and add to the appearance of the cutlery display. The boxes are made in three lengths: small, medium and large, all 3 $\frac{1}{2}$  inches high, to take in different lengths of pocket knives. Boxes are also made for razors, shears, &c.